FCC CFR47 CERTIFICATION

PART 22H and 24E

TEST REPORT

FOR

AMPS / PCS / GPS CELLULAR PHONE

MODEL: BD6070, MD6070, CX6070

FCC ID: BEJBD6070

REPORT NUMBER: 03I1865-1

ISSUE DATE: APRIL 03, 2003

Prepared for
LG ELECTRONICS
459-9, KASAN-DONG, KUNCHON-GU
SEOUL, SOUTH KOREA 153-023

Prepared by
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1. TEST RESULT CERTIFICATION

COMPANY NAME: LG ELECTRONICS
459-9, KASAN-DONG, KUNCHON-GU
SEOUL, SOUTH KOREA 153-023

CONTACT PERSON: EUI-SOON PARK / SENIOR RESEARCH ENGINEER

TELEPHONE NO: (822) 850-3861

EUT DESCRIPTION: AMPS / PCS / GPS CELLULAR PHONE

MODEM NAME: BD6070, MD6070, CX6070

DATE TESTED: APRIL 03, 2003

TYPE OF EQUIPMENT	INTENTIONAL RADIATOR
EQUIPMENT TYPE	LICENSED TX MODULE IN MOBILE APPLICATION
MEASUREMENT PROCEDURE	ANSI 63.4 / 2001, TIA/EIA 603
PROCEDURE	CERTIFICATION
FCC RULE	CFR 47 PART 22 Subpart H and 24 Subpart E

Compliance Certification Services, Inc. tested the above equipment for compliance with the requirement set forth in CFR 47, PART 22 Subpart H-Cellular Radiotelephone Service and 24 Subpart E-Broadband PCS. The equipment in the configuration described in this report, shows the measured emission levels emanating from the equipment do not exceed the specified limit.

Note : This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

Tested By:

WILLIAM ZHUANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Released For CCS By:

THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

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2. EUT DESCRIPTION

The Tri Band, Quad Mode CDMA Mobile Phone has an output power 28.74dBm (AMPS, EIRP), 25.90dBm (CDMA, EIRP), and 27.70dBm (PCS, EIRP). It has a fixed type (Helical + Meander) antenna, and 3 ~8dBi gain which is designed for the Cellular & PCS bands transmitting of frequency range 824 ~ 849MHz and 1850 ~ 1990MHz.

3. TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures documented on chapter 13 of ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057.

4. TEST FACILITY

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5. ACCREDITATION AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200065-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (reference no: 31040/SIT (1300B3) and 31040/SIT (1300F2))

6. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

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7. TEST SETUP, PROCEDURE AND RESULT

7.1. SECTION 2.1046: RF POWER OUTPUT

INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	CAL. DUE DATE
Spectrum Analyzer	HP	8593EM	6/11/03
RF Synthesizer	HP	83732B	3/29/03
Amplifier	MITEQ	NSP2600-44	4/26/03
LP Antenna	EMCO	3146	3/6/04
Horn Antenna	EMCO	3115 SN: 2238	2/4/04
Horn Antenna	EMCO	3115 SN: 3245	2/4/04
Dipole Antenna	COMPLIANCE DESIGN	ROBERTS	8/9/03

MEASUREMENT PROCEDURE

1). On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.

2). The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the frequency of the transmitter.

3). The output of the test antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.

4). The transmitter shall be switched on, if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.

5). The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.

6). The transmitter shall than be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

7). The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.

8). The maximum signal level detected by the measuring receiver shall be noted.

9). The transmitter shall be replaced by a tuned dipole (substitution antenna).

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10). The substitution antenna shall be oriented for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.

11). The substitution antenna shall be connected to a calibrated signal generator.

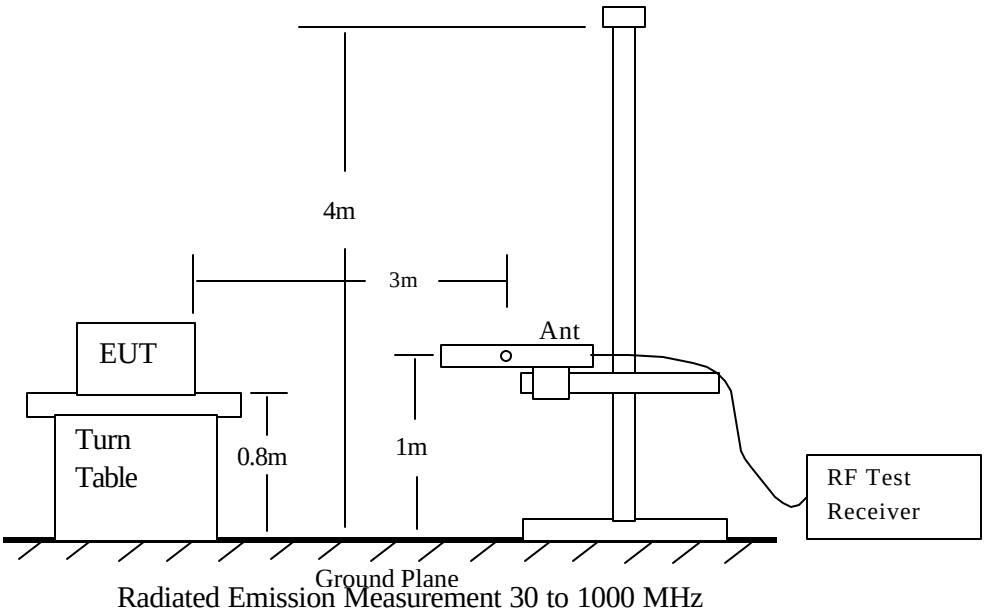
12). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

13). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
14). The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.

15). The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

16). The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

17). The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.



Radiated Emission Measurement 30 to 1000 MHz

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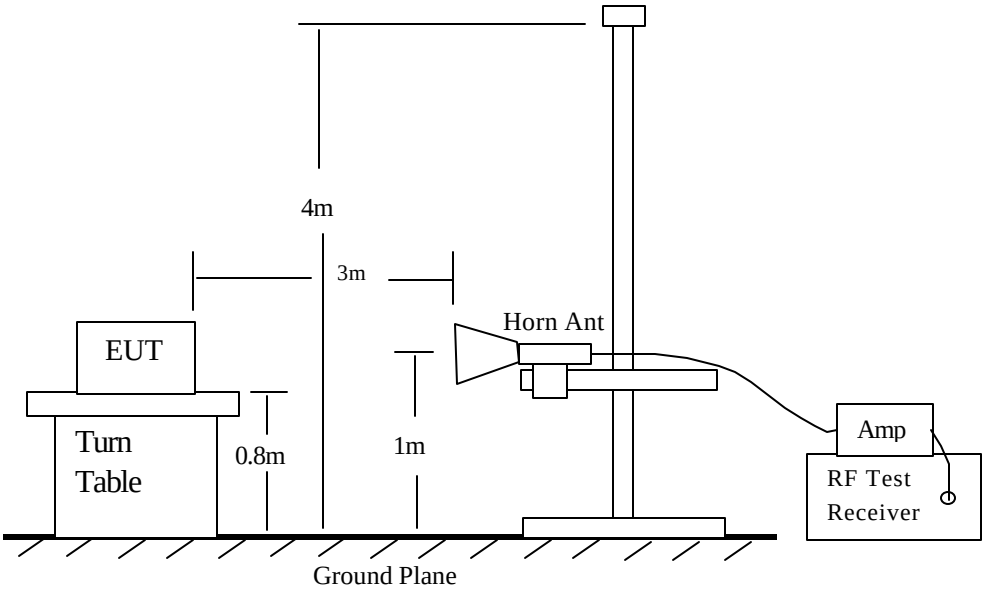
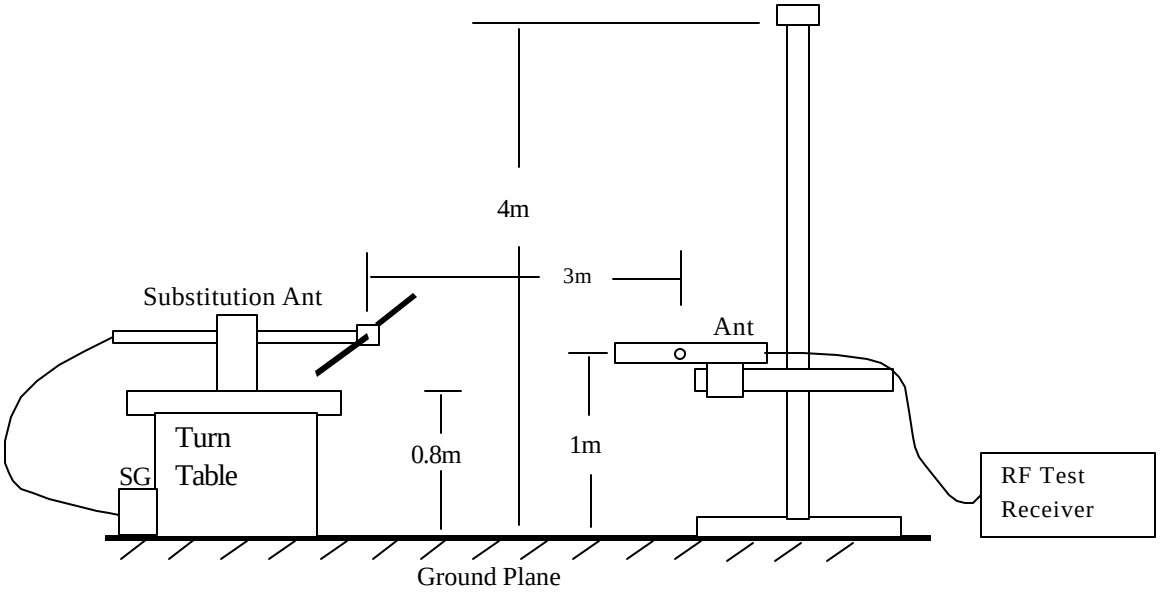


Radiated Emission Above 1000 MHz



Radiated Emission – Substitution Method setup

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Test result:

Company Name: LG Electronics
Project Number: 03I1865
EUT Description: Tri Band, Quad Mode CDMA Mobile Phone

AMPS

	Ch.#	Freq. (MHz)	Peak Power Meter (dBm)	Peak Power ERP (dBm)
Low Ch.	1011	824.64	25.92	26.80
Mid Ch.	383	836.49	26.50	28.74
High Ch.	779	848.37	25.10	27.49

CDMA

	Ch.#	Freq. (MHz)	Peak Power Meter (dBm)	Output Power ERP (dBm)
Low Ch.	1017	824.82	23.98	25.90
Mid Ch.	383	836.49	24.20	25.35
High Ch.	772	848.19	23.60	25.19

PCS

	Ch.#	Freq. (MHz)	Peak Power Meter (dBm)	Output Power EIRP (dBm)
Low Ch.	25	1851.25	24.27	27.70
Mid Ch.	600	1880	24.25	27.35
High Ch.	1175	1908.75	20.42	23.50

Note: Antenna Gain is 3~8 dBi

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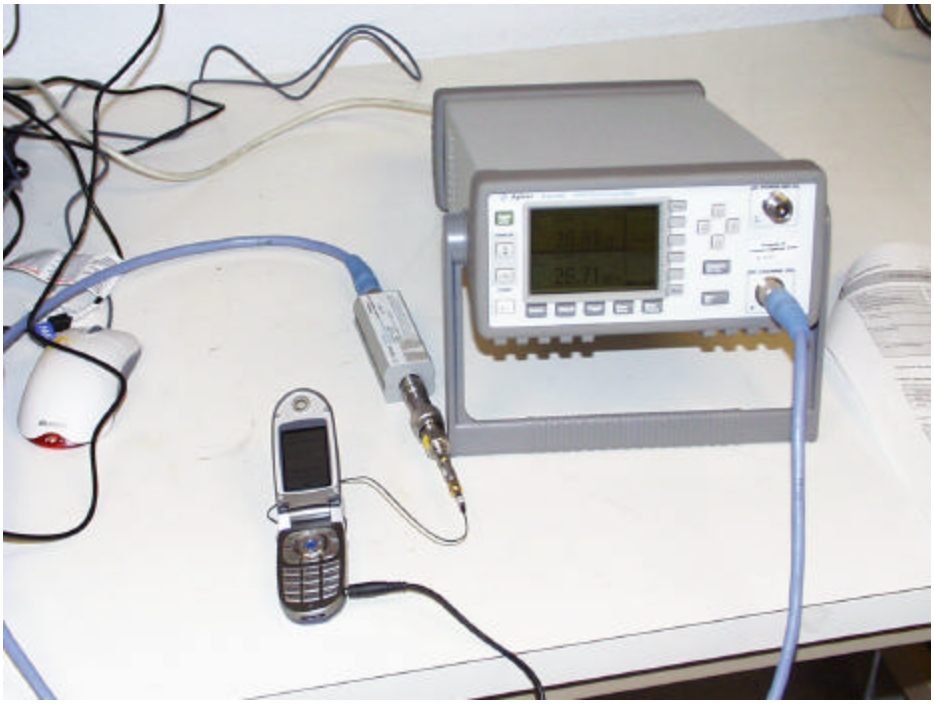
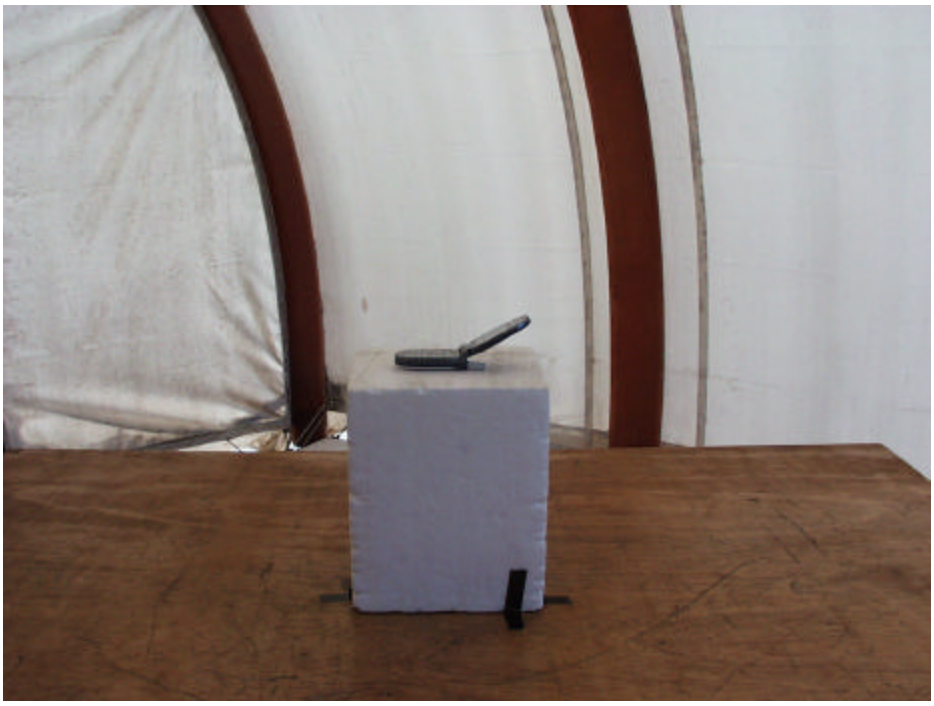
Peak Power Meter



Radiated Emissions



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CDMA & AMPS Output Power (ERP):

Frequency (GHz)	SA reading (dBuV)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
CDMA:									
0.82	113.0	25.90	0.50	0.00	0.00	25.40	38.45	-13.05	V
0.84	113.0	25.80	0.50	0.00	0.00	25.30	38.45	-13.15	V
0.85	112.0	25.39	0.50	0.00	0.00	24.89	38.45	-13.56	V
0.82	117.8	26.40	0.50	0.00	0.00	25.90	38.45	-12.55	H
0.84	117.0	25.85	0.50	0.00	0.00	25.35	38.45	-13.10	H
0.85	116.6	25.69	0.50	0.00	0.00	25.19	38.45	-13.26	H
AMPS:									
0.82	114.2	27.10	0.50	0.00	0.00	26.60	38.45	-11.85	V
0.84	116.1	28.90	0.50	0.00	0.00	28.40	38.45	-10.05	V
0.85	114.3	27.69	0.50	0.00	0.00	27.19	38.45	-11.26	V
0.82	118.7	27.30	0.50	0.00	0.00	26.80	38.45	-11.65	H
0.84	120.4	29.24	0.50	0.00	0.00	28.74	38.45	-9.71	H
0.85	118.9	27.99	0.50	0.00	0.00	27.49	38.45	-10.96	H

PCS Output Power (EIRP):

Frequency (GHz)	SA reading (dBuV)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Fundamental (Low, Mid, & High Channels):									
1.851	86.6	11.70	0.80	7.20	0.00	18.10	33.00	-14.90	V
1.851	95.7	21.30	0.80	7.20	0.00	27.70	33.00	-5.30	H
1.880	85.3	10.40	0.80	7.25	0.00	16.85	33.00	-16.15	V
1.880	95.5	20.90	0.80	7.25	0.00	27.35	33.00	-5.65	H
1.909	82.0	7.20	0.80	7.30	0.00	13.70	33.00	-19.30	V
1.909	91.3	17.00	0.80	7.30	0.00	23.50	33.00	-9.50	H

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7.2. SECTION 2.1047: MODULATION CHARACTERISTICS

PROVISIONS APPLICABLE

According to CFR 47 section 2.1047 (a), for Voice Modulated Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000 Hz shall be measured.

According to CFR 47 section 22.915 _ An unit that transmits emission type F3E must not exceed a peak frequency deviation of ± 5KHz, and the audio frequency response shall not exceed 3.125 KHz.

According to CFR 47 section 22.915 _ Audio Frequency Low Pass Filter between the modulation limiter & the modulation stage of the transmitter. At any frequency (f in KHz) between 3 and 20 KHz, the filter must have an attenuation of at least 60 $\log_{10}(f/3)$ dB greater than the attenuation at 1 KHz. Above 20 KHz, it must have an attenuation of at least 50 dB greater than the attenuation at 1 KHz.

MEASUREMENT METHOD

Modulation Limit

1). Configure the EUT as shown below, adjust the audio input for 60% of rated system deviation at 1 KHz using this level as a reference (0 dB) and vary the input level from -20 to +20 dB. Record the frequency deviation obtained as a function of the input level.

2). Repeat step 1 with input frequency changing to 300, 1004, and 2500 Hz in sequence.

Audio Frequency Response

1). Configure the EUT as shown below.

2). Adjust the audio input for 20% of rated system deviation at 1 KHz using this level as a reference (0 dB).

3). Vary the Audio frequency from 100 Hz to 10 KHz and record the frequency deviation.

4). Audio Frequency Response = 20 $\log_{10}$ (Deviation of test frequency / Deviation of 1KHz reference).

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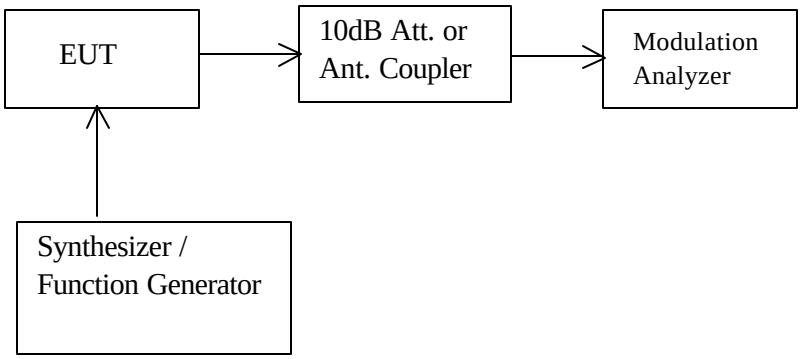


Modulation characteristic measurement configuration

Audio Low Pass Filter Response

1). Configure the EUT as shown below.

2). Connect the audio frequency generator as close as possible the input of the post limiter low pass filter within the transmitter under test.

3). Connect the audio spectrum analyzer to the output of the post limiter low pass filter within the transmitter under test.

4). Apply 1000 Hz tone from the audio frequency generator and adjust the level per manufacturer's specifications.

5). Record the dB level of the 1000 Hz spectral line on the audio spectrum analyzer as LEV_{REF}.

6). Set the audio frequency generator to the desired test frequency between 3000 Hz and the upper low pass filter limit.

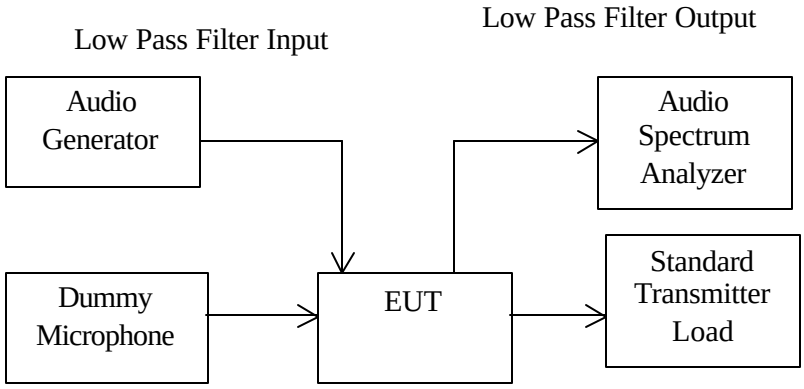
7). Record audio spectrum analyzer levels, at the frequency in step 6).

8). Record the dB level on the audio spectrum analyzer as LEV_{FREQ}.

9). Calculate the audio frequency response at the test frequency as:

low pass filter response = LEV_{FREQ} - LEV_{REF}

10). Repeat the 6) through 9) for all the desired test frequencies.



Audio low pass filter response measurement configuration

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MEASUREMENT INSTRUMENT

EQUIPMENT	MANUFACTURE	MODEL NO.	CAL. DUE DATE
Modulation Analyzer	HP	8901b	6/12/03
Attenuator	MINI CIRCUITS	MCL BW-S10W2	N/A
Audio Signal Generator	HP	3325A	5/8/04
CDMA Mobile Test Set	HP	8924C	7/17/03
40dB Coupler	Amplifier Research	DC7144A	N.C.R
DC Power Supply	Kenwood	PA36-3A	N.C.R

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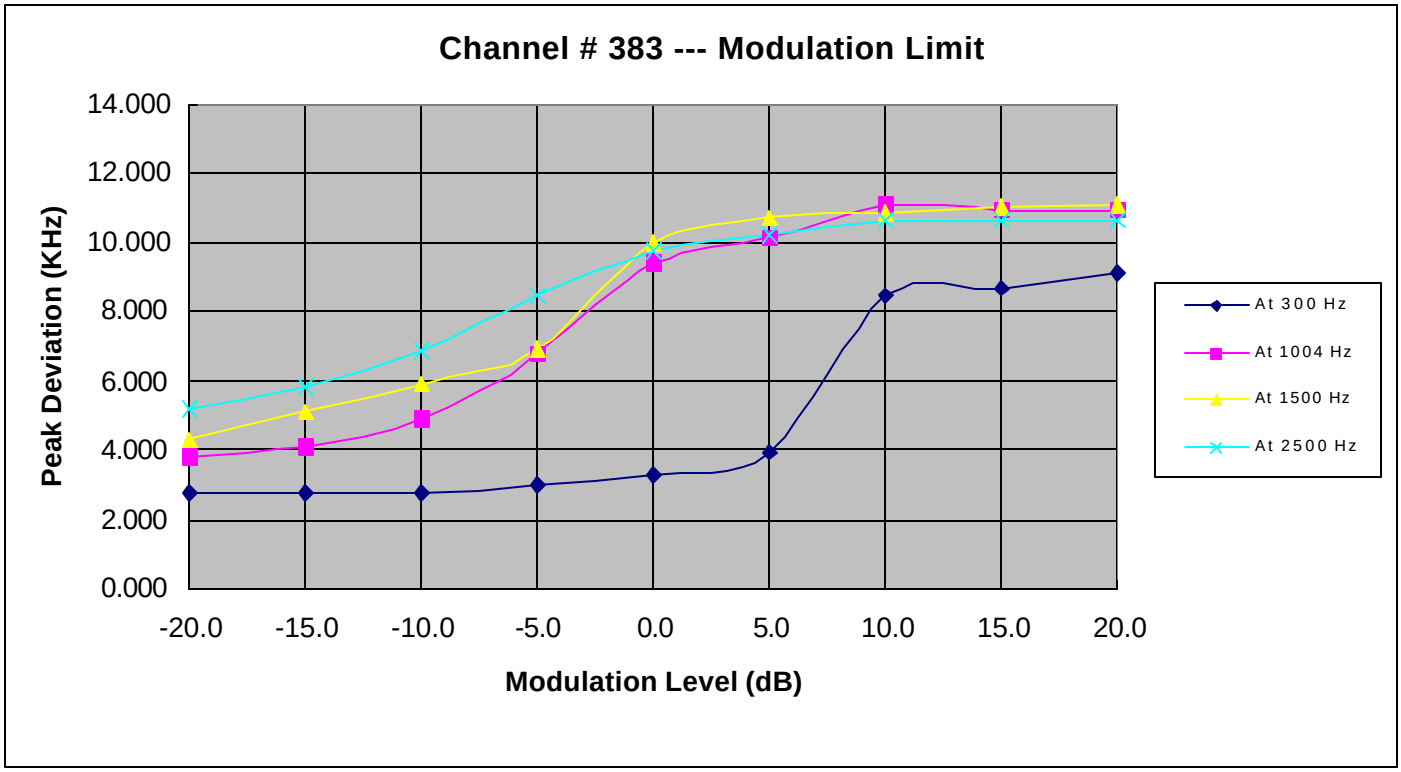
MEASUREMENT RESULT

a). Modulation Limit:



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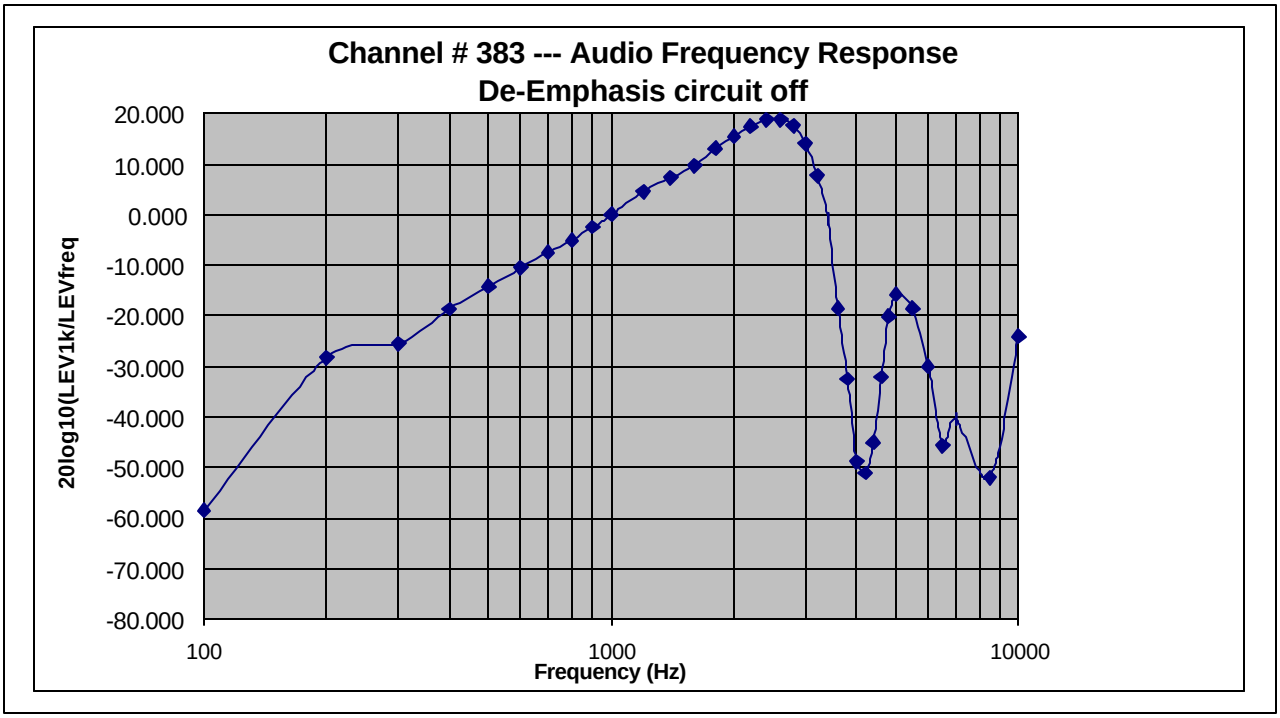
b). Audio Frequency Response:



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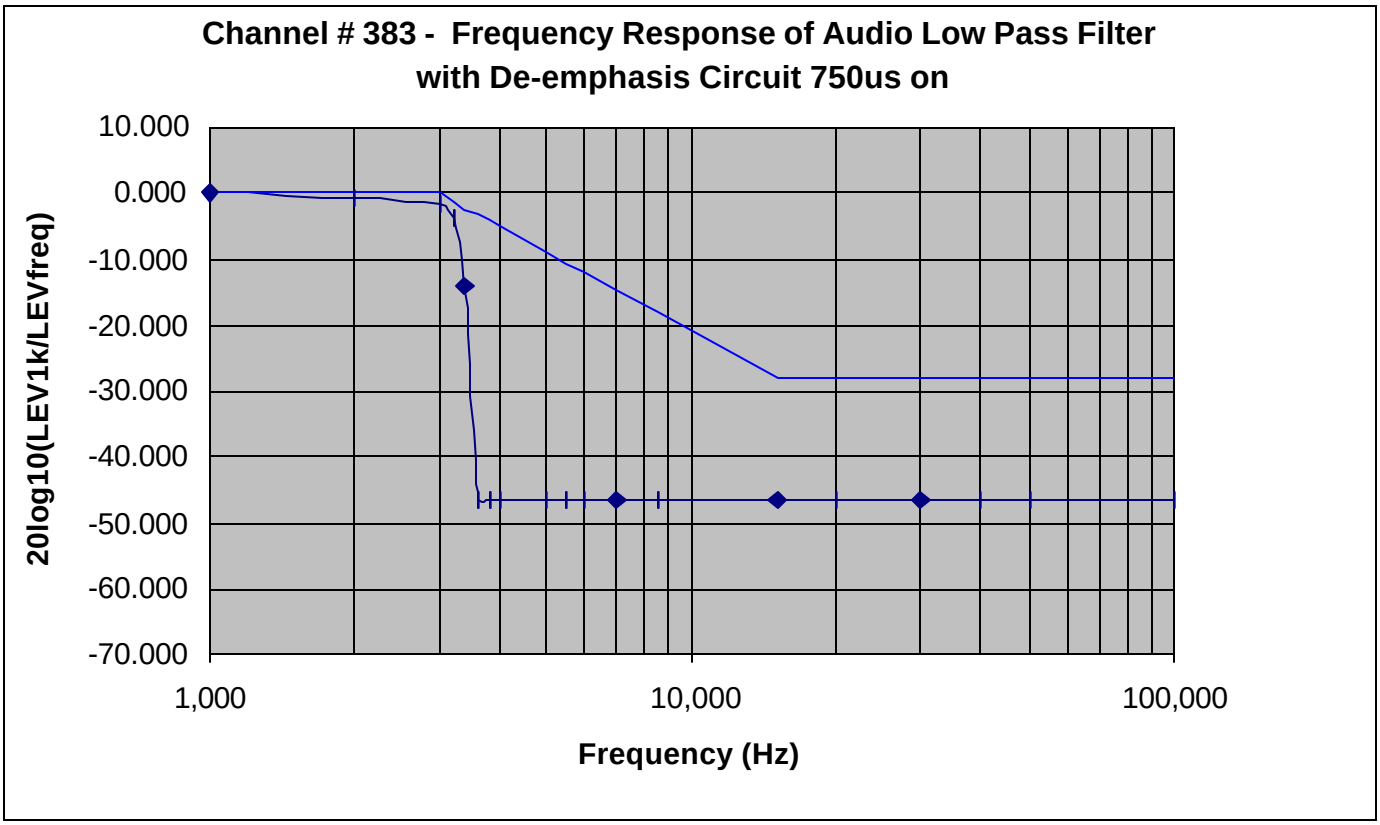
c). Audio low pass filter response:



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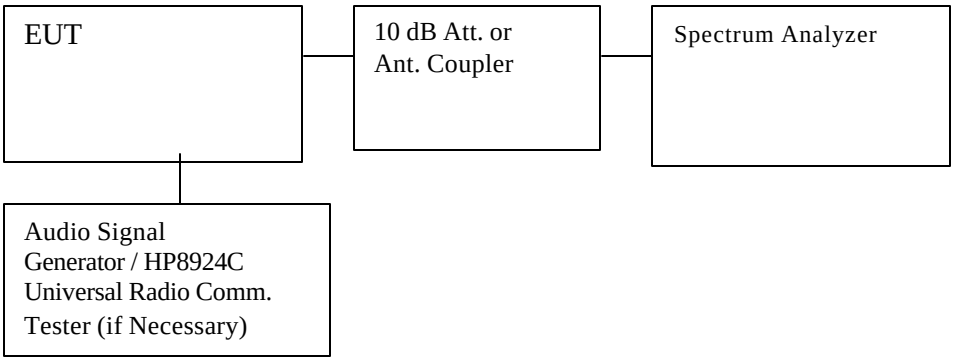
7.3. SECTION 2.1049: OCCUPIED BANDWIDTH

PROVISIONS APPLICABLE
According to CFR 47 section 22.917, the authorized bandwidth for emission type of F3E unit is 20 KHz.



Set-up Configuration

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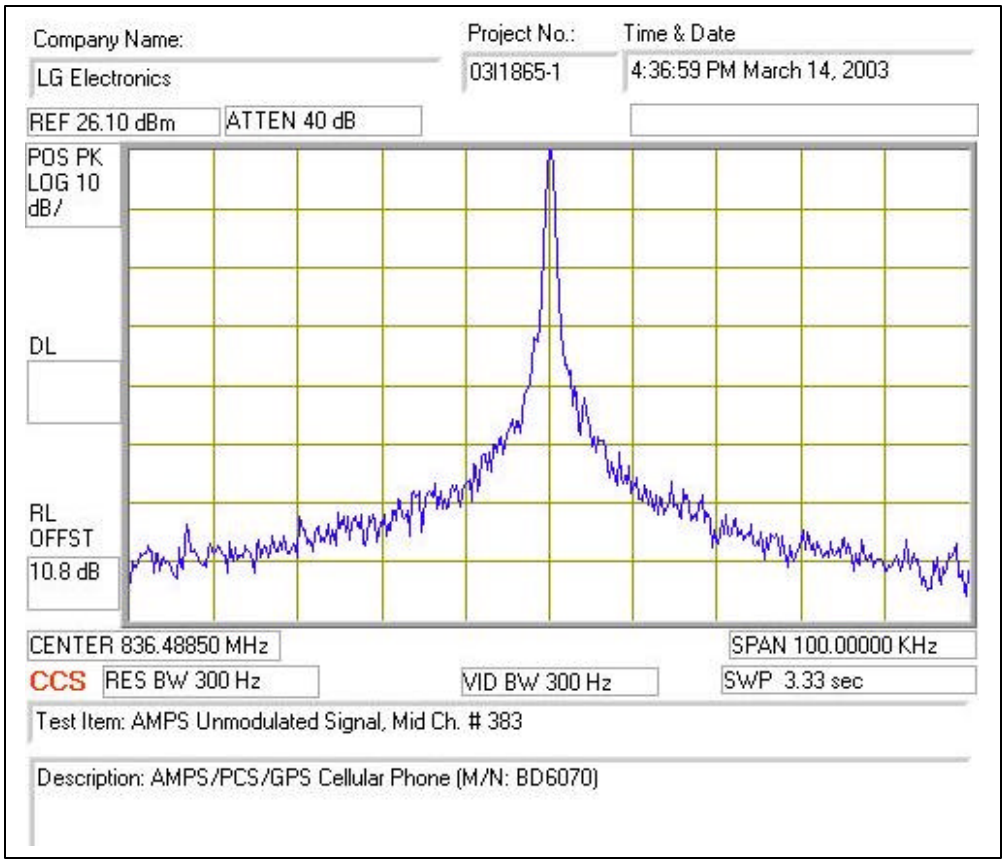
7.3.1. Un-modulated Signal

INSTRUMENT SETTING:
Resolution Bandwidth = 300Hz
Video Bandwidth = 300Hz

Limit:
N/A

Test Result:



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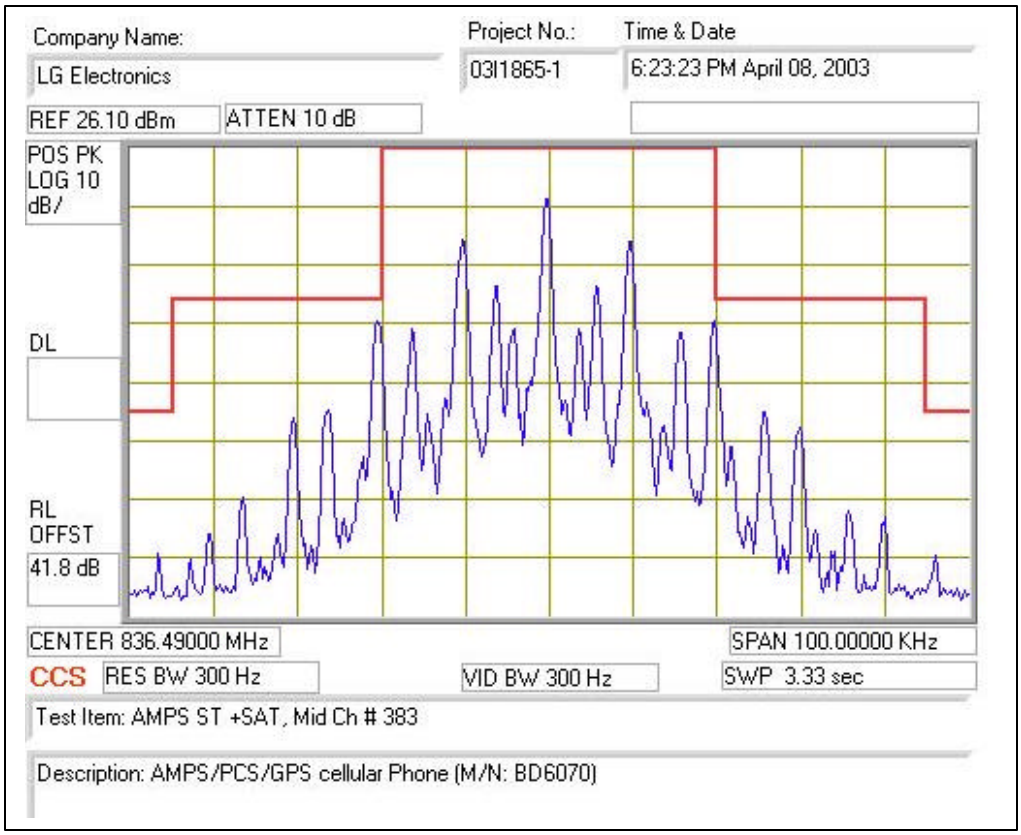
7.3.2. Signaling Tone (ST) + Supervisory Audio Tone (SAT)

INSTRUMENT SETTING:
Resolution Bandwidth = 300Hz
Video Bandwidth = 300Hz
Signal Tone = 10KHz

Limit (22.917d):

a. On any freqyency removed from the assigned carrier frequency by more than 20KHz, up to and including 45KHz, the sideband is at least 26dB below the carrier.
b. On any frequency removed from the assigned carrier frequency by more than 45Khz, up to and including 90KHz, the sideband is at least 45dB below the carrier.
c. On any frequency removed from the assigned carrier frequency by more than 90KHz, up to the first multiple of the carrier frequency, the sideband is at least 60dB below the carrier or 43 +10 $\log_{10}$ (mean output power in W) dB, whichever is the smaller attenuation.

Test Result:



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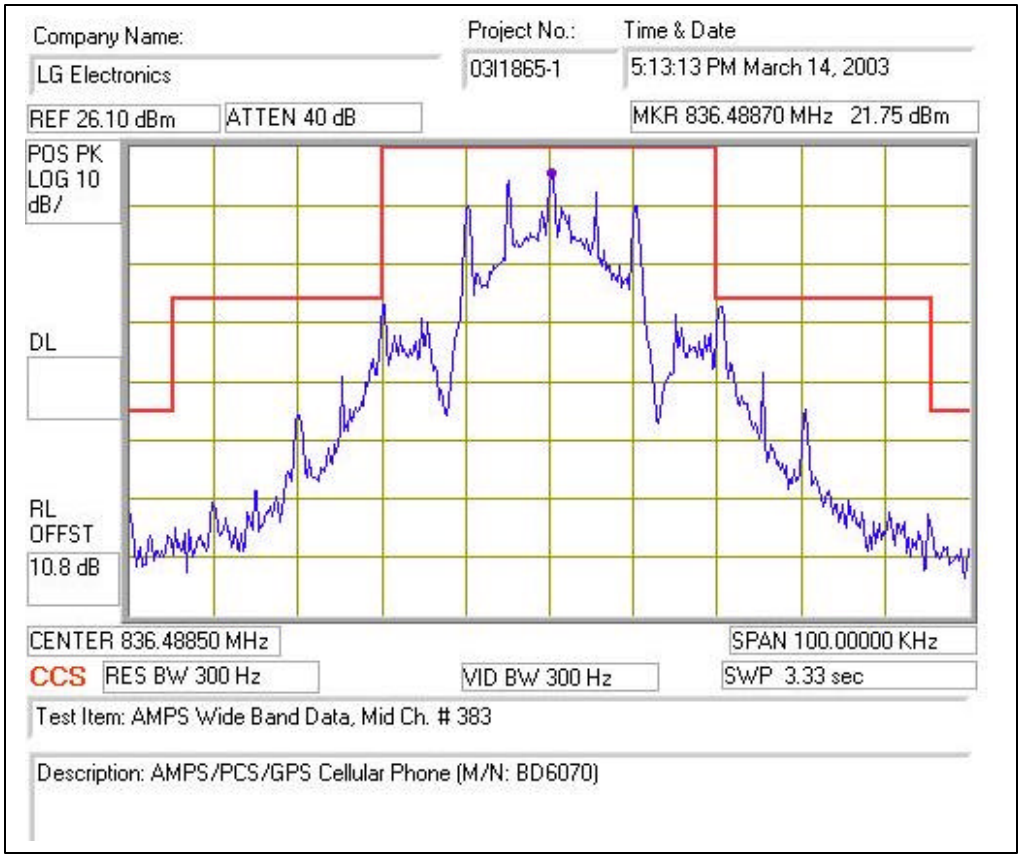
7.3.3. Wide Band Data (WBD)

INSTRUMENT SETTING:
Resolution Bandwidth = 300Hz
Video Bandwidth = 300Hz

Limit (22.917d):

a. On any freqyency removed from the assigned carrier frequency by more than 20KHz, up to and including 45KHz, the sideband is at least 26dB below the carrier.
b. On any frequency removed from the assigned carrier frequency by more than 45Khz, up to and including 90KHz, the sideband is at least 45dB below the carrier.
c. On any frequency removed from the assigned carrier frequency by more than 90KHz, up to the first multiple of the carrier frequency, the sideband is at least 60dB below the carrier or 43 +10 $\log_{10}$ (mean output power in W) dB, whichever is the smaller attenuation.

Test Result:



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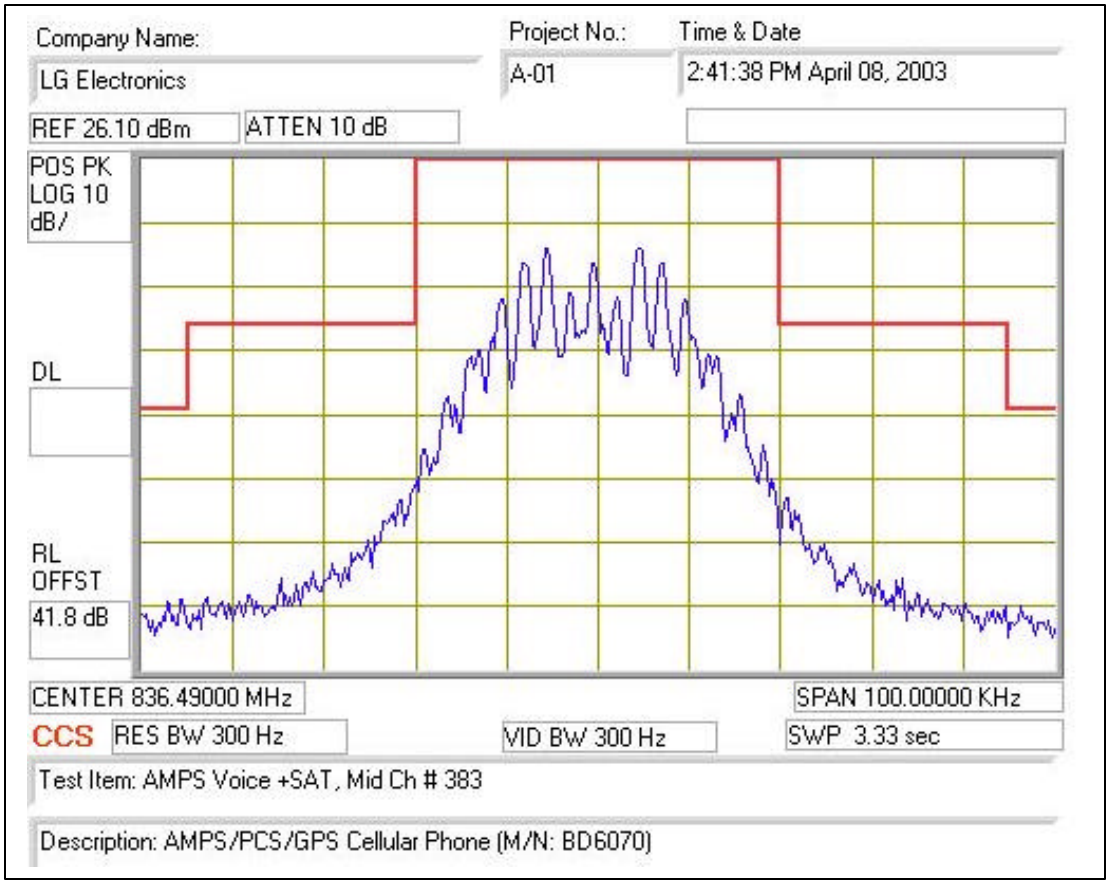
7.3.4. Voice + Supervisory Audio Tone (SAT)

INSTRUMENT SETTING:
Resolution Bandwidth = 300Hz
Video Bandwidth = 300Hz
Audio Tone = 2.5KHz
Audio Level = 16dB greater than level required to produce ±8KHz (Minimum level from technical specifications)

Limit (22.917b):

a. On any freqyency removed from the assigned carrier frequency by more than 20KHz, up to and including 45KHz, the sideband is at least 26dB below the carrier.
b. On any frequency removed from the assigned carrier frequency by more than 45Khz, up to the first multiple of the carrier frequency, the sideband is at least 60dB below the carrier or 43 +10 $\log_{10}$ (mean output power in W) dB, whichever is the smaller attenuation

Test Result:



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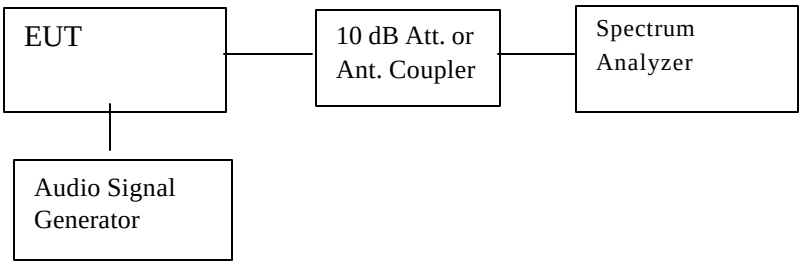
7.4. SECTION 2.1051: SPURIOUS EMISSION AT ANTENNA TERMINAL

INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	CAL. DUE DATE
Spectrum Analyzer	HP	8593EM	6/11/03
Attenuator	MINI CIRCUITS	MCL BW-S10W2	N/A
Modulation Analyzer	HP	8901b	6/12/03
Audio Signal Generator	HP	3325A	5/8/04

TEST SETUP



TEST PROCEDURE

1) EUT's RF output connector (made solely for the purpose of the test) is connected to the spectrum analyzer, and set as close as possible to the bottom of the block edge and one set as close as possible to the top of the block edge. Set the RES BW to 1% of the emission bandwidth to show compliance with the –13dBm limit, in the 1 MHz bands immediately outside and adjacent to the top and bottom edges of the frequency block.

2) For the Out-of-Band measurements a 1 MHz RES BW was used to scan from 15 MHz to 10xfo of the fundamental carrier for all frequency block. A display line was placed at –13dBm to show compliance for spurious, and harmonics.

3) 22.917(f): Mobile emissions in base frequency range. The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitter operated must be attenuated to a level not to exceed –80dBm at the transmit antenna connector.

COMPLIANCE CERTIFICATION SERVICES DOCUMENT NO: CCSUP4031A
561F MONTEREY ROAD, MORGAN HILL, CA 95037 USA TEL: (408) 463-0885 FAX: (408) 463-0888
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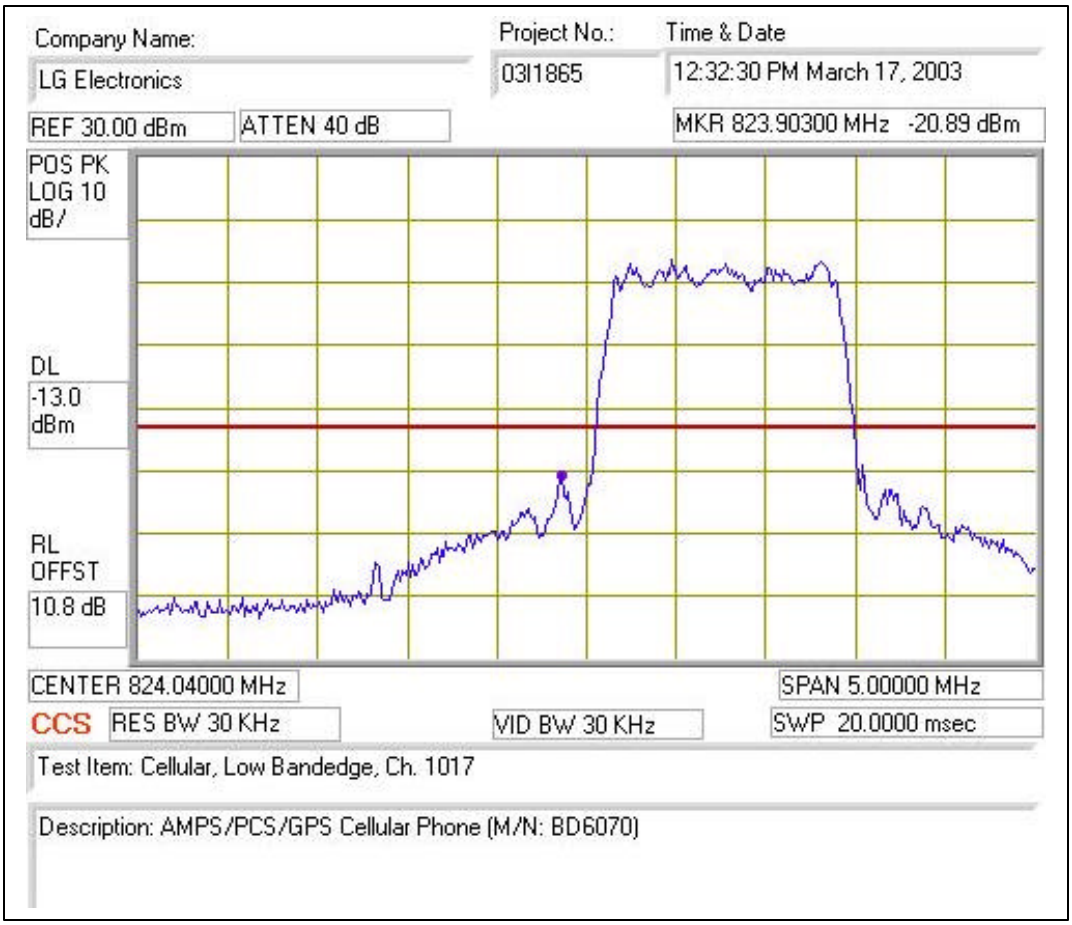
RESULT:

CDMA Modulation: Low / Mid / High, Band Edge, Out-Of-Band Emissions



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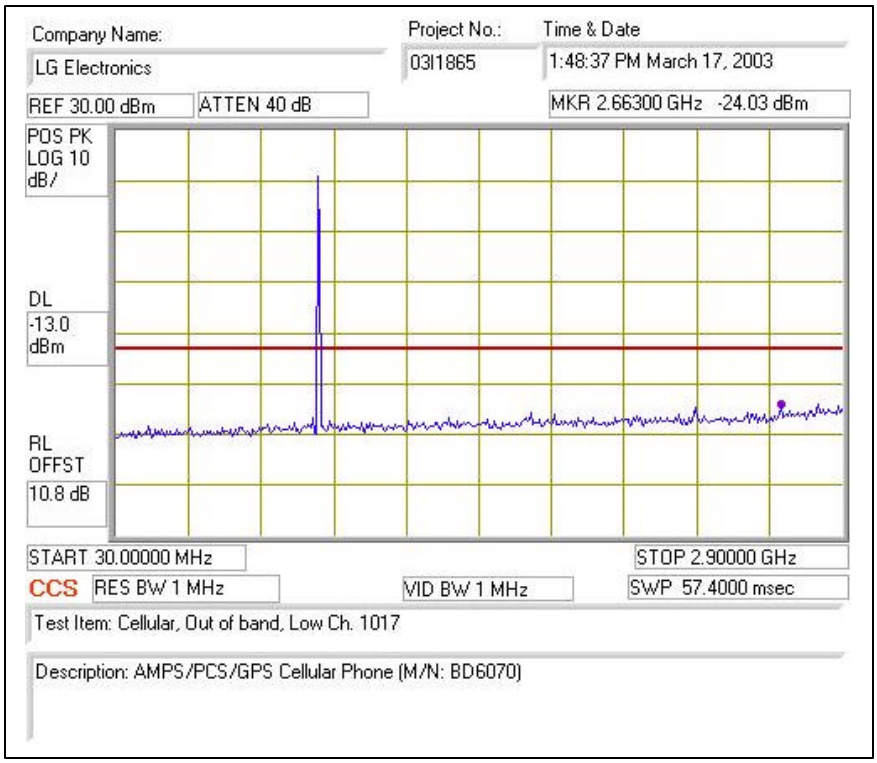

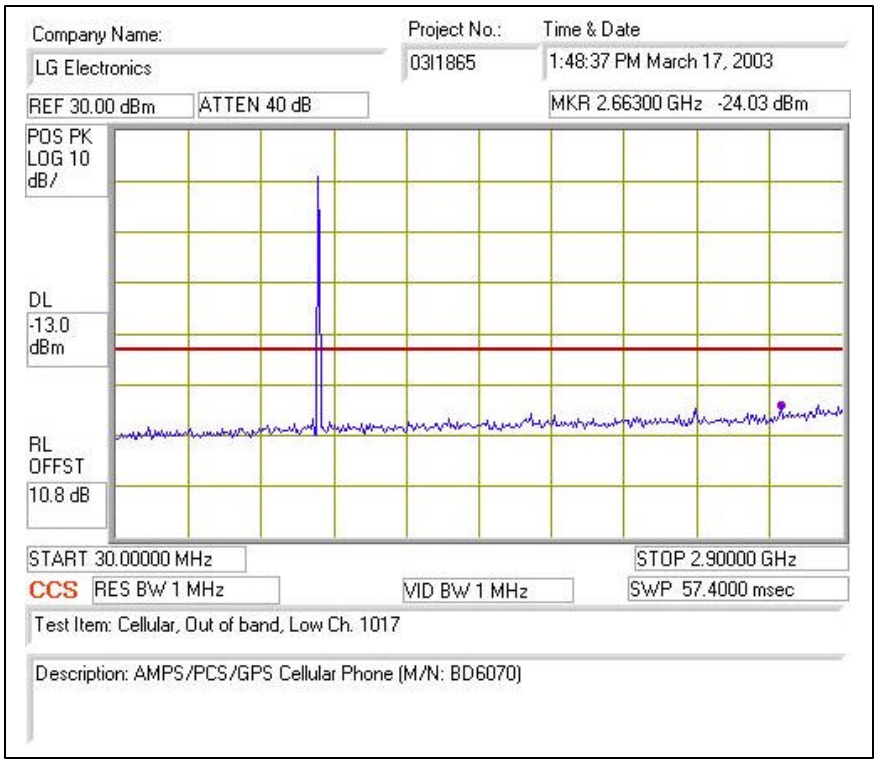

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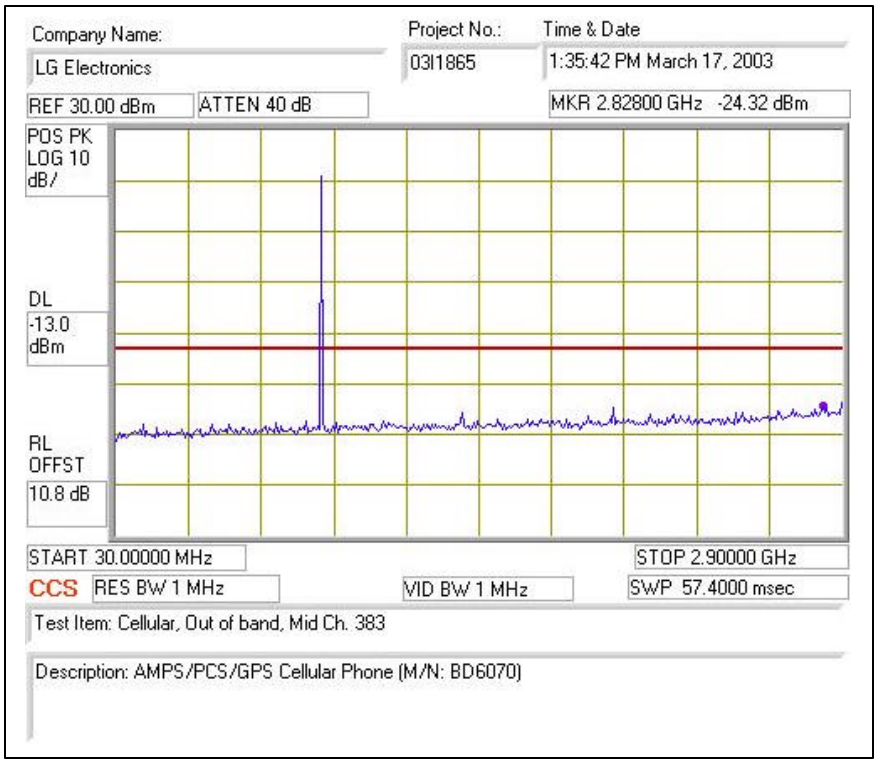

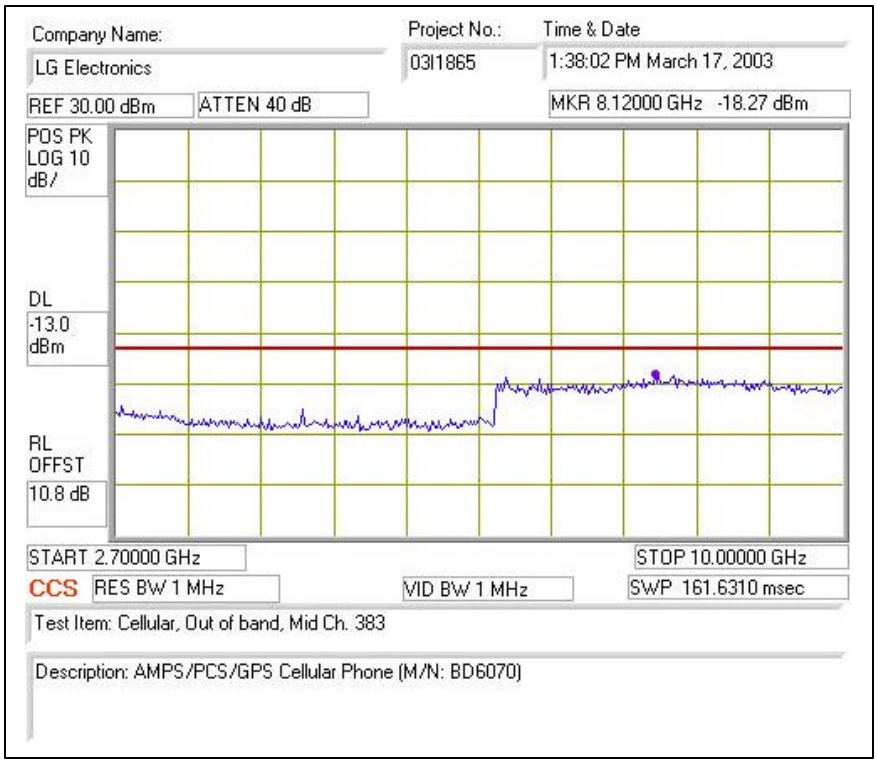

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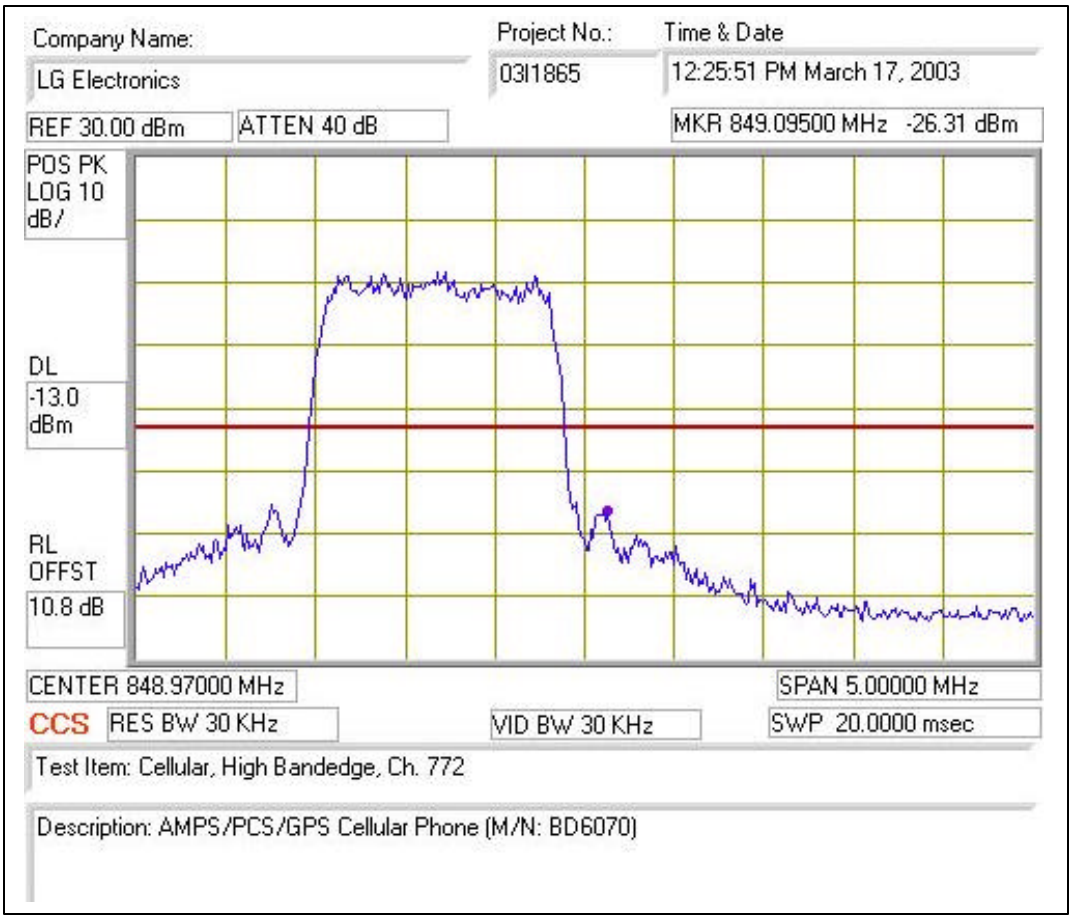

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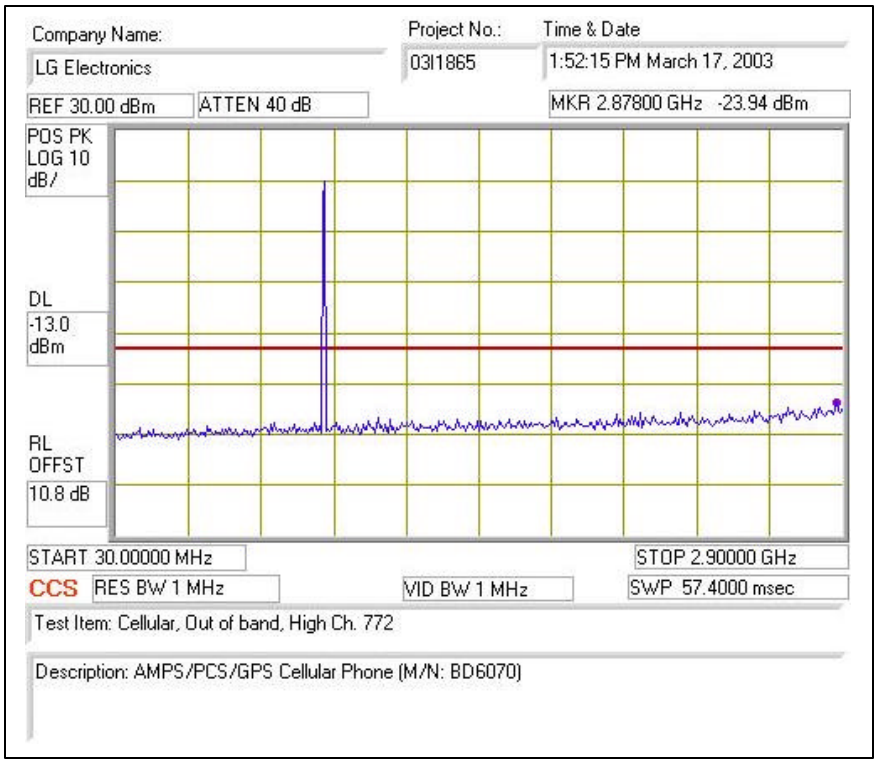

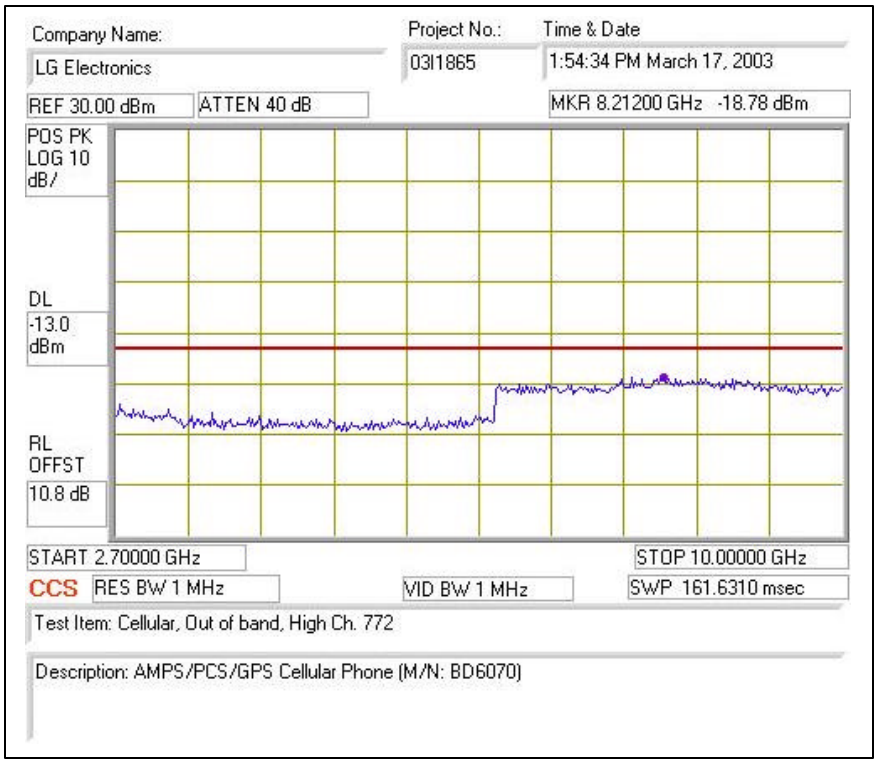

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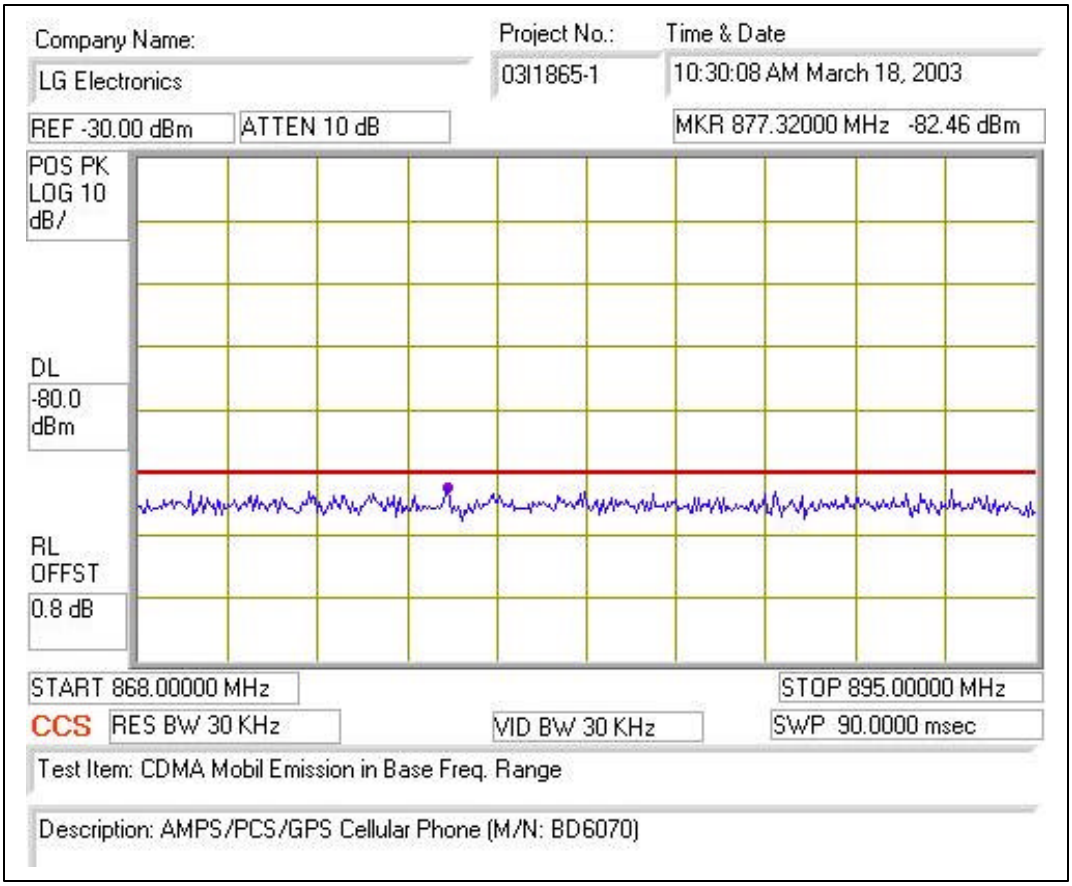
CDMA Mobile Emissions in Base Frequency Range:



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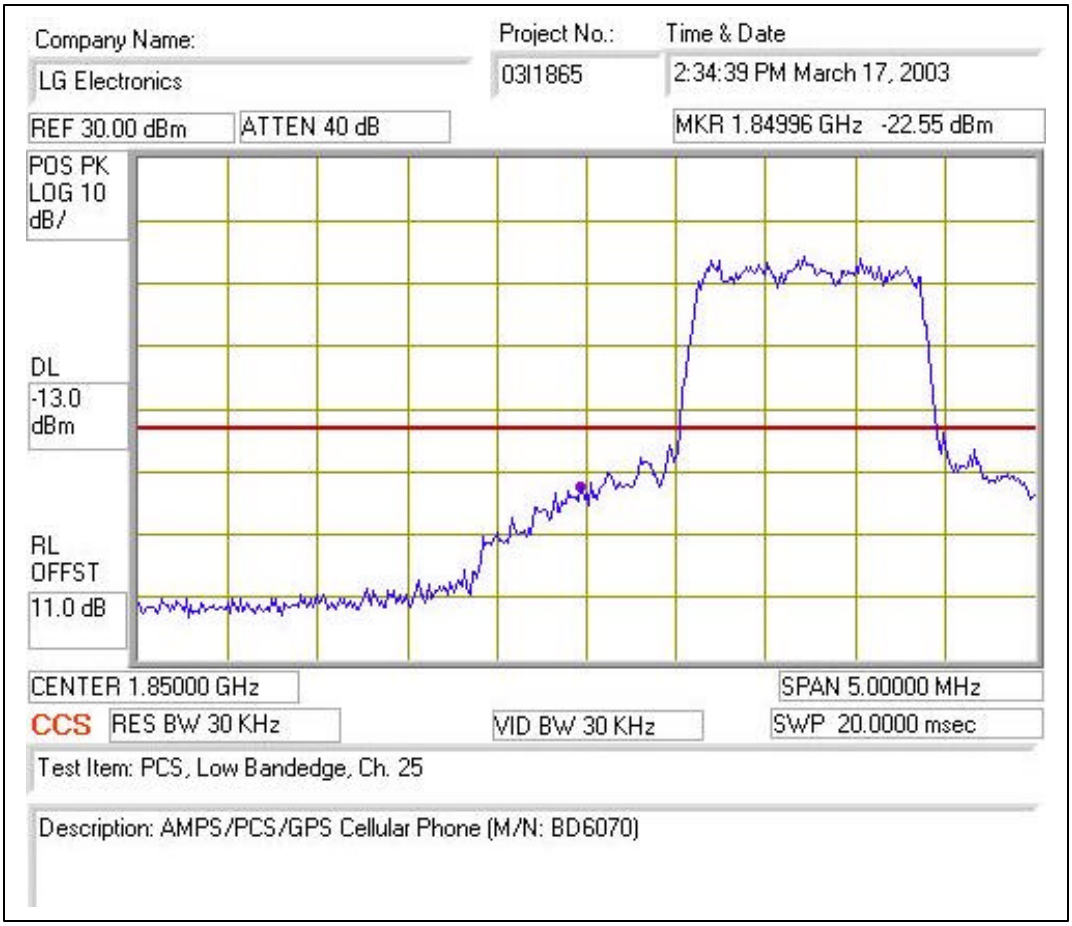
PCS Modulation: Low / Mid / High, Band Edge, Out-Of-Band Emissions



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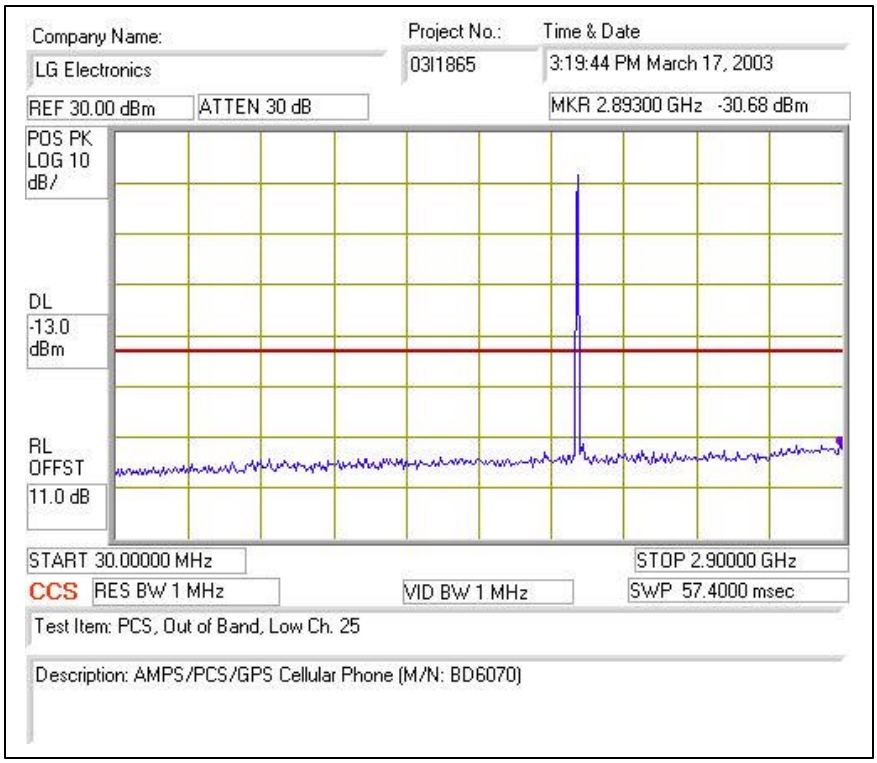

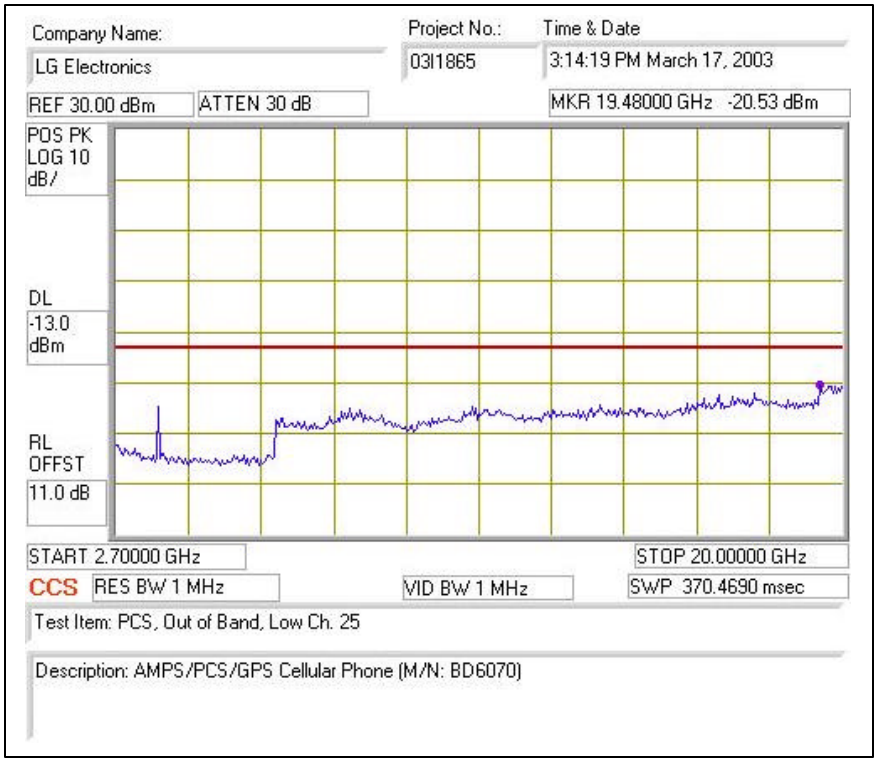

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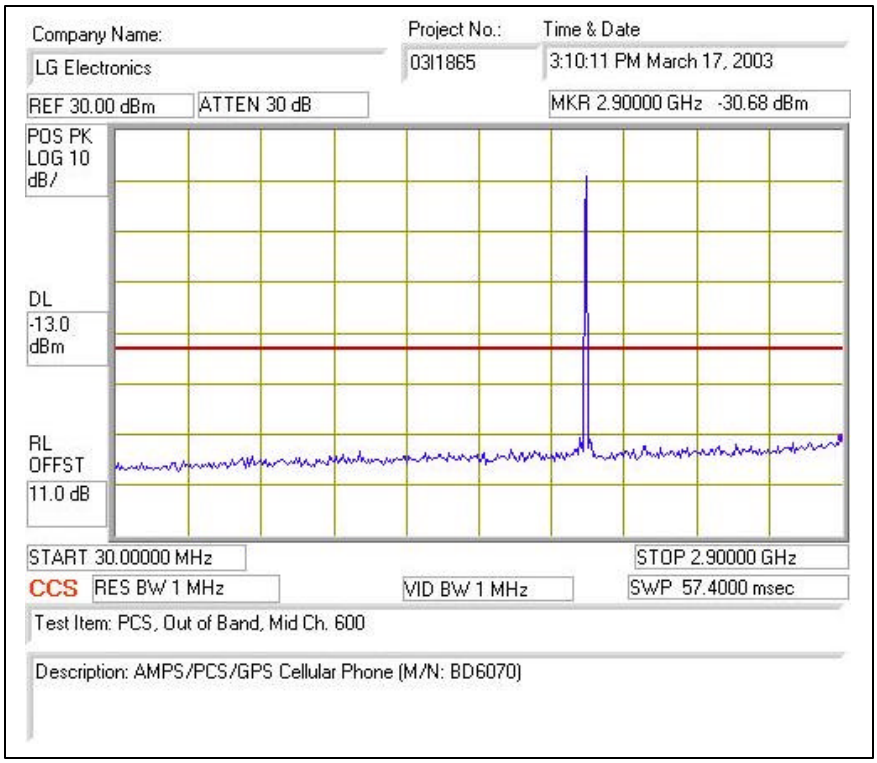

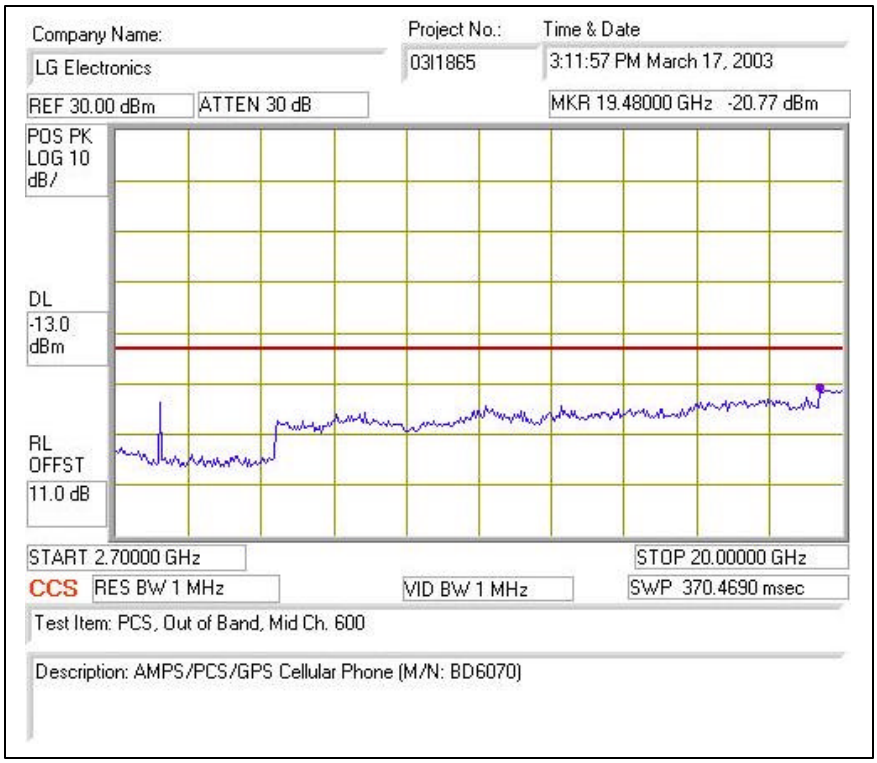

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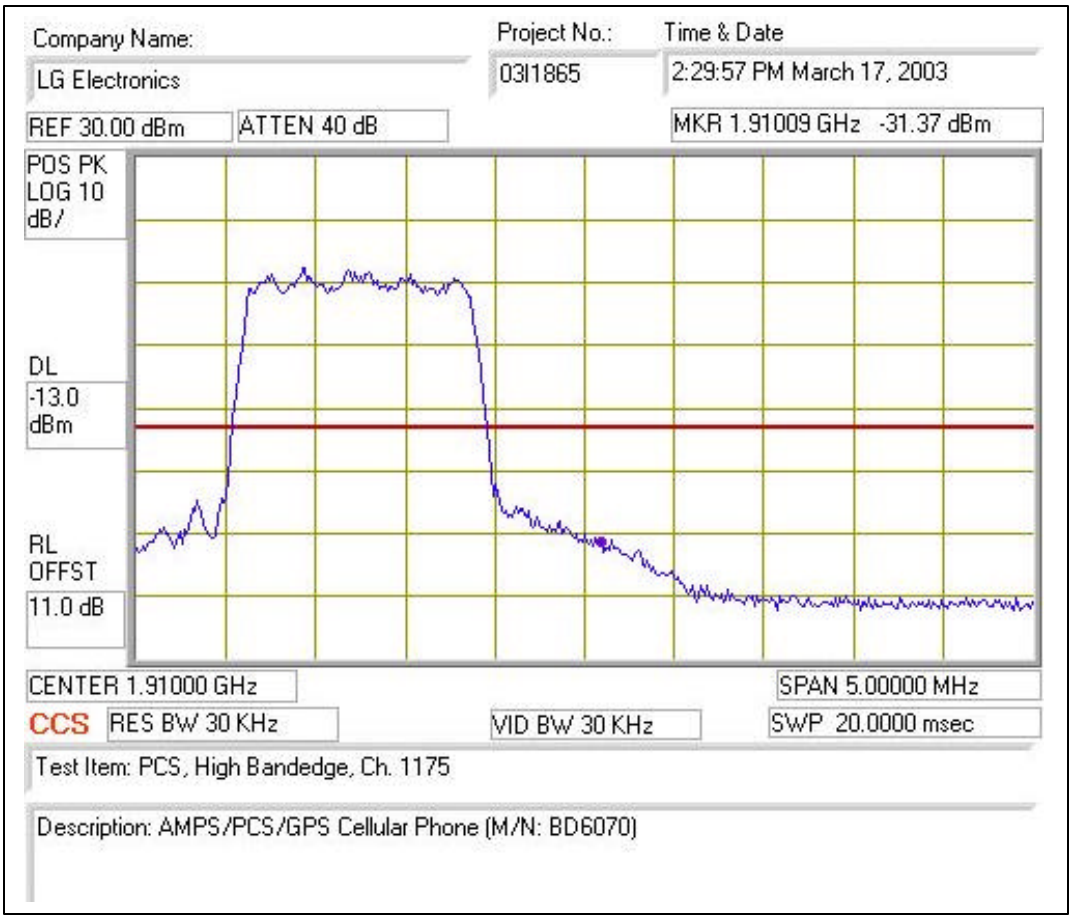

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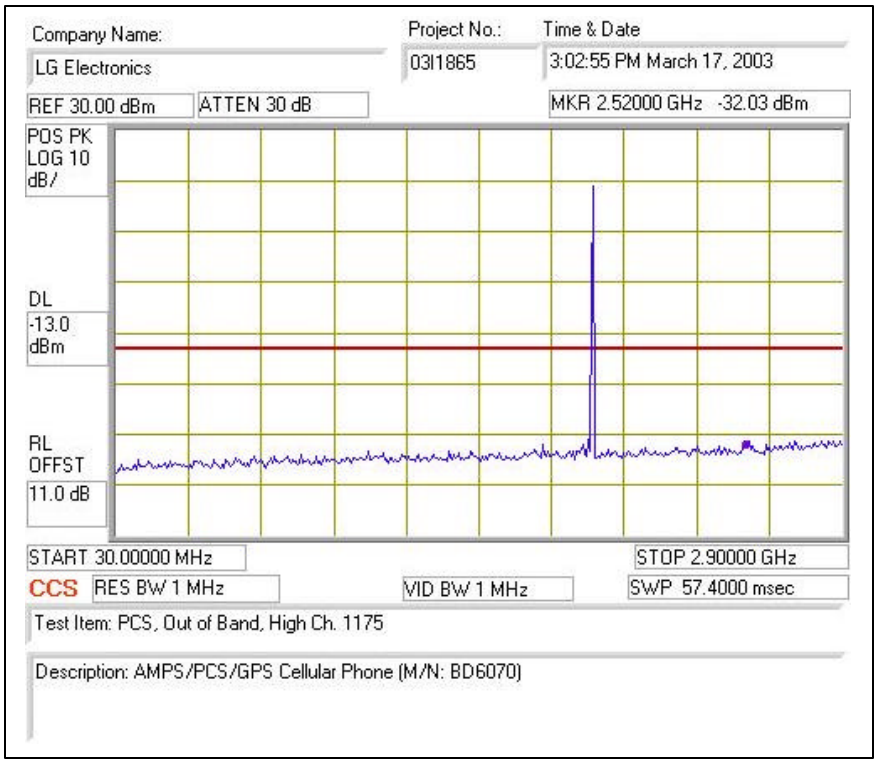

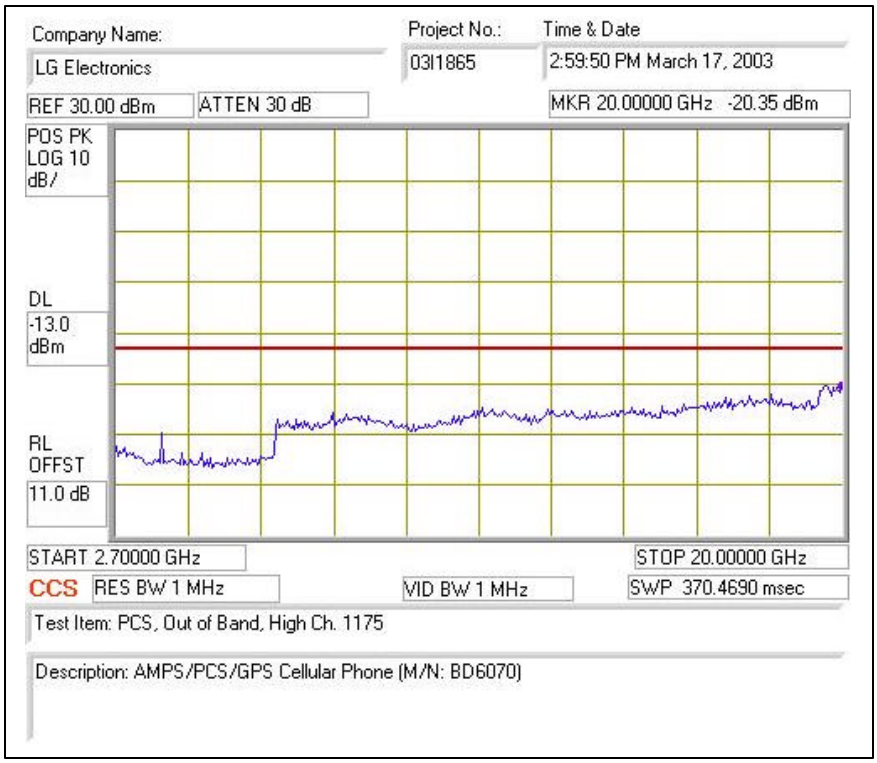

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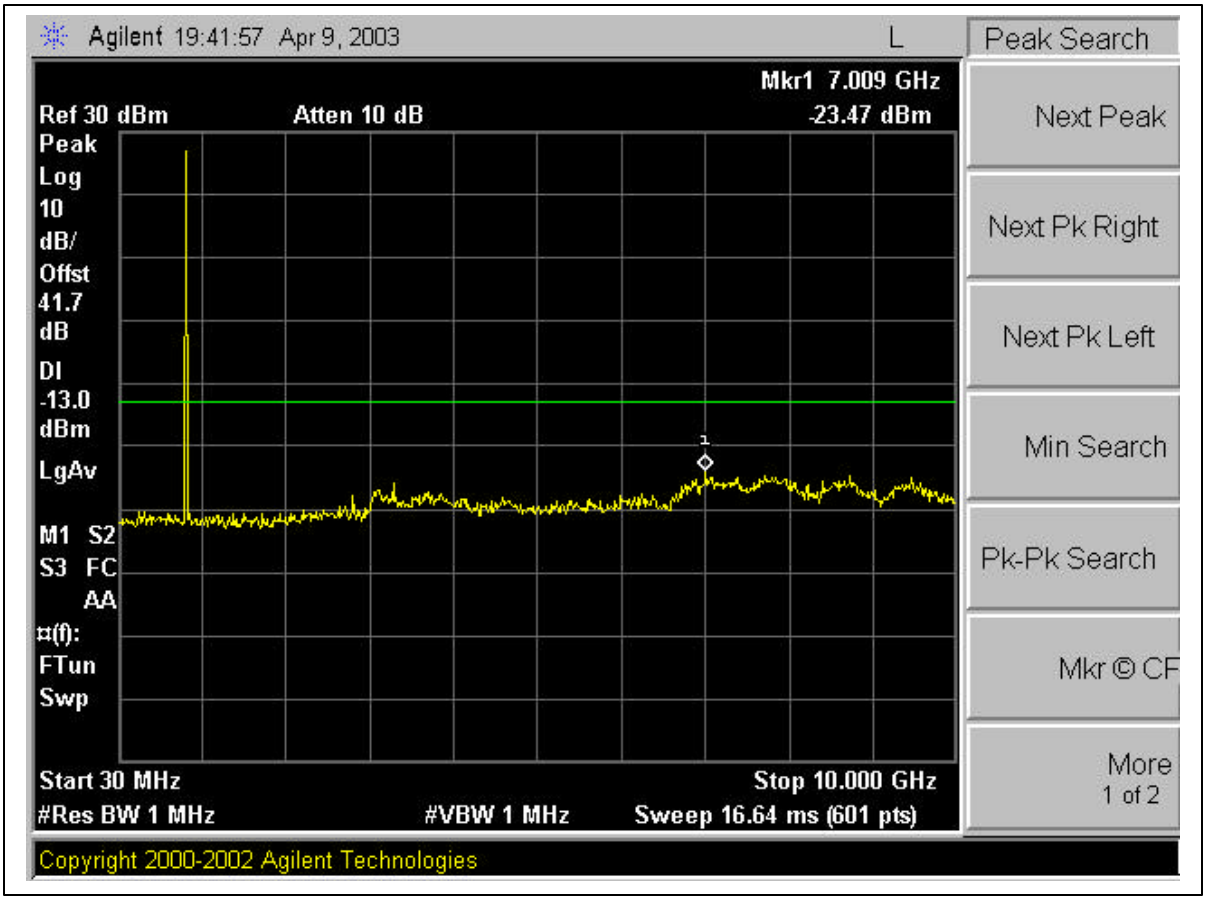
AMPS Modulation: Low / Mid / High, Out-Of-Band Emissions



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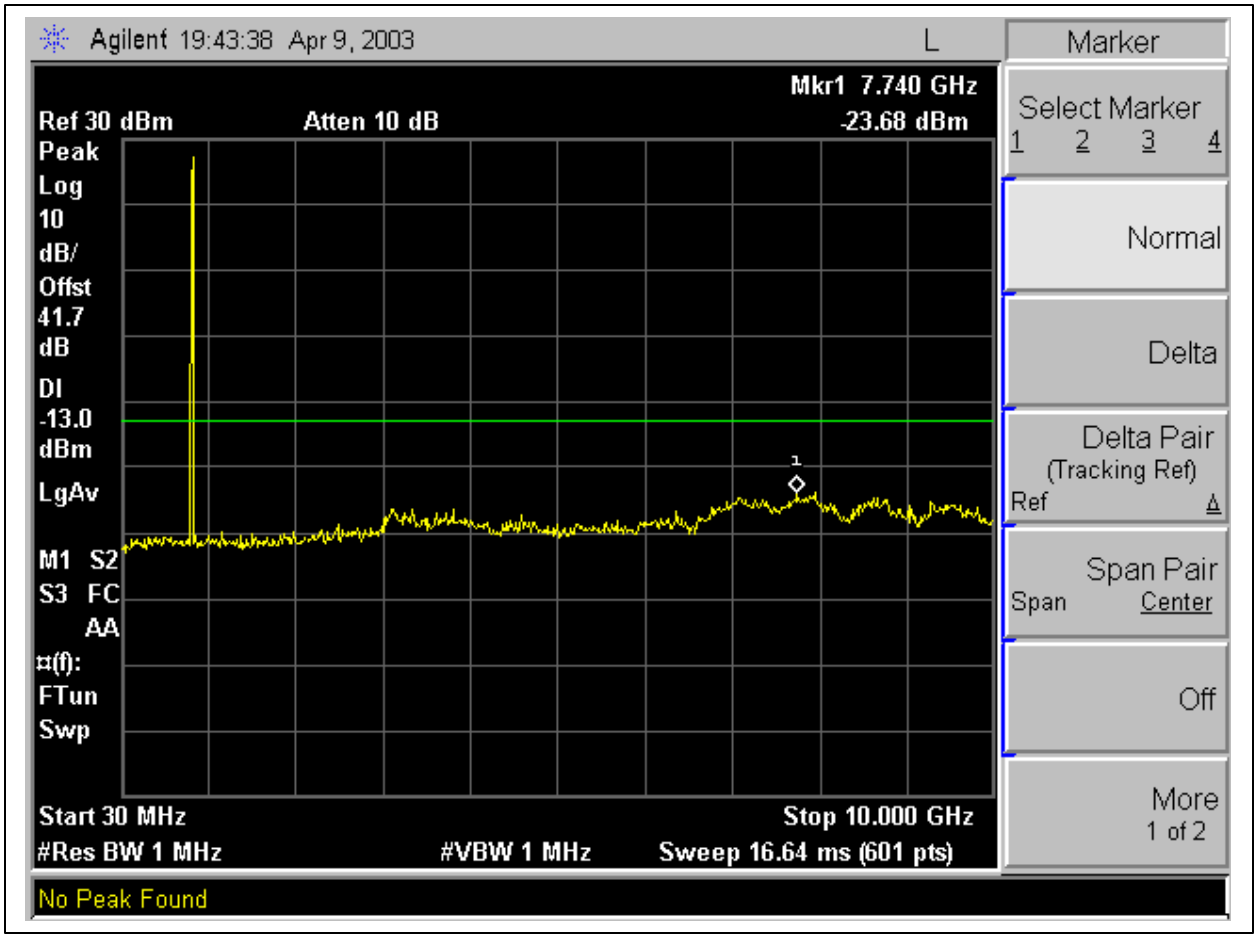

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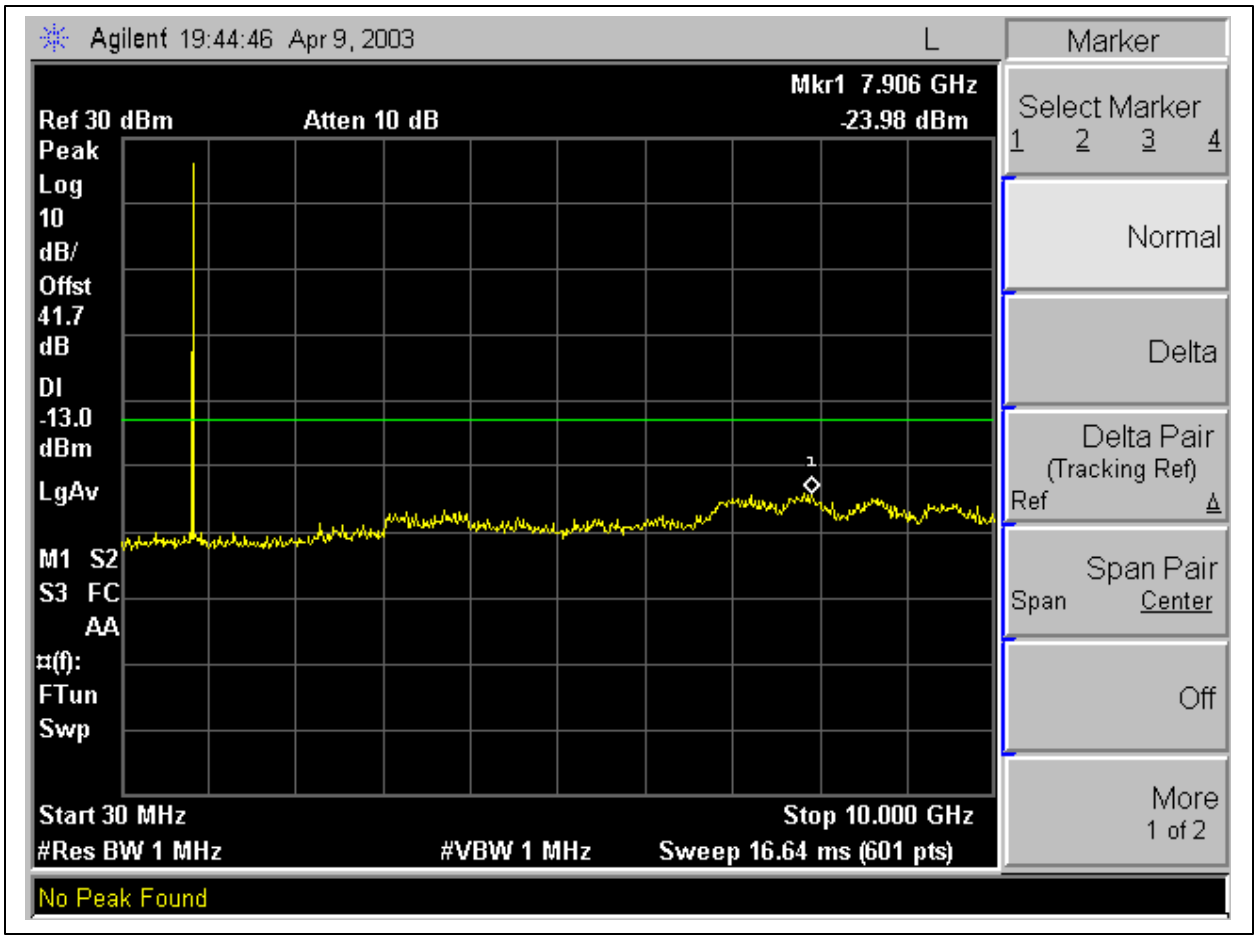

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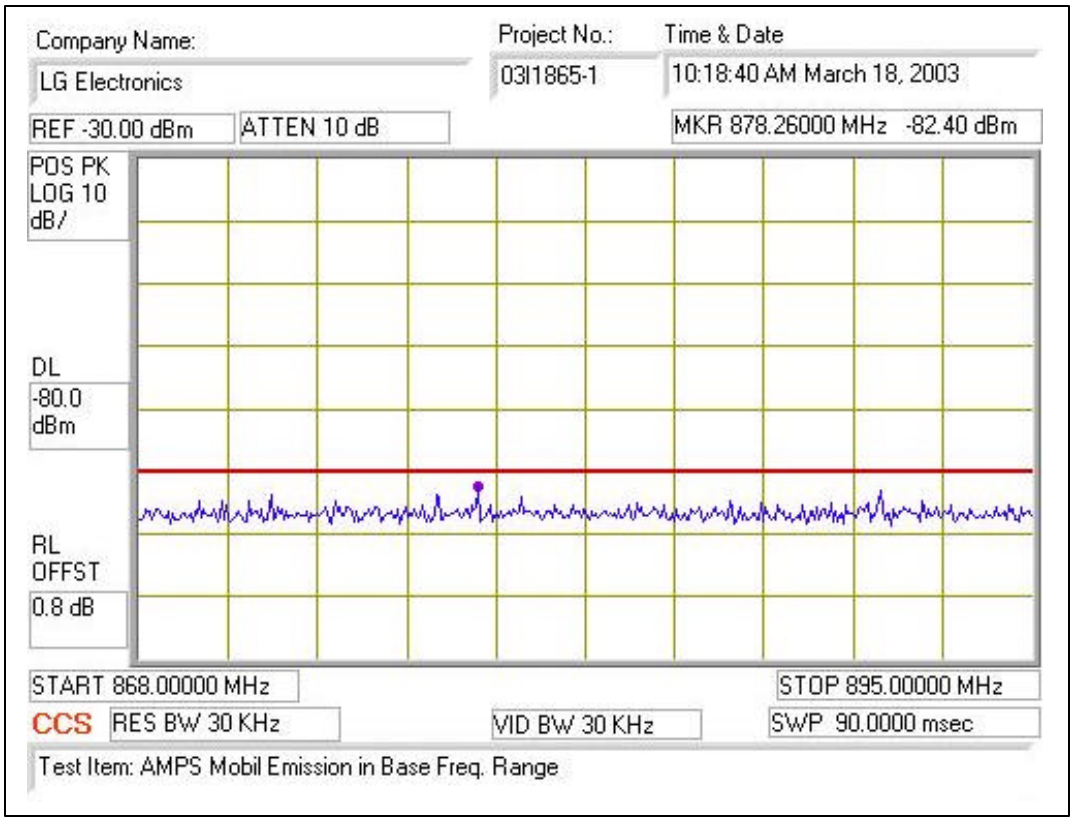
AMPS Mobile Emissions in Base Frequency Range:



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7.5. SECTION 2.1053: FIELD STRENGTH OF SPURIOUS RADIATION

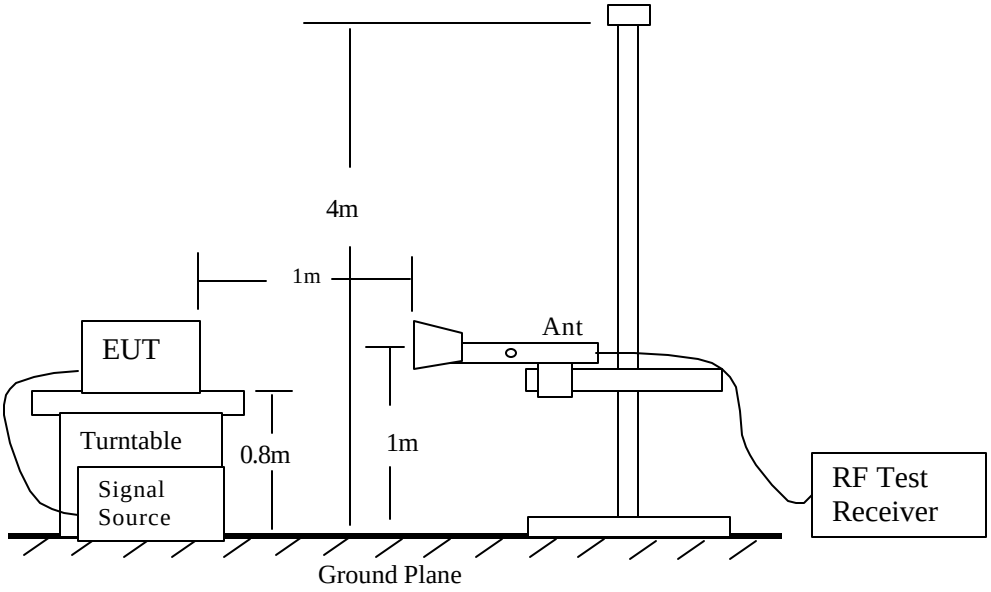
INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	CAL. DUE DATE
Spectrum Analyzer	HP	8593EM	6/11/03
Amplifier	MITEQ	NSP2600-44	4/26/03
Signal Generator	Rohde & Schwarz	SMP04	5/25/03
Bicon Antenna	Eaton	94455-1	3/6/04
LP Antenna	EMCO	3146	3/6/04
Tune Dipole	Compliance Design	Robert	5/8/03
Tx Horn Antenna	EMCO	3115	2/4/04
Rx Horn Antenna	EMCO	3115	2/4/04
HPF	MICROLAB	FH-1800H	N/A
HPF	MICROLAB	FH-2400H	N/A
50 ohm terminator	SHX	TF-5	N/A

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	☒ Peak ☐ Average	☒ 1 MHz ☐ 1 MHz	☒ 1 MHz ☐ 10 Hz

TEST SETUP



Radiated Emission Measurement

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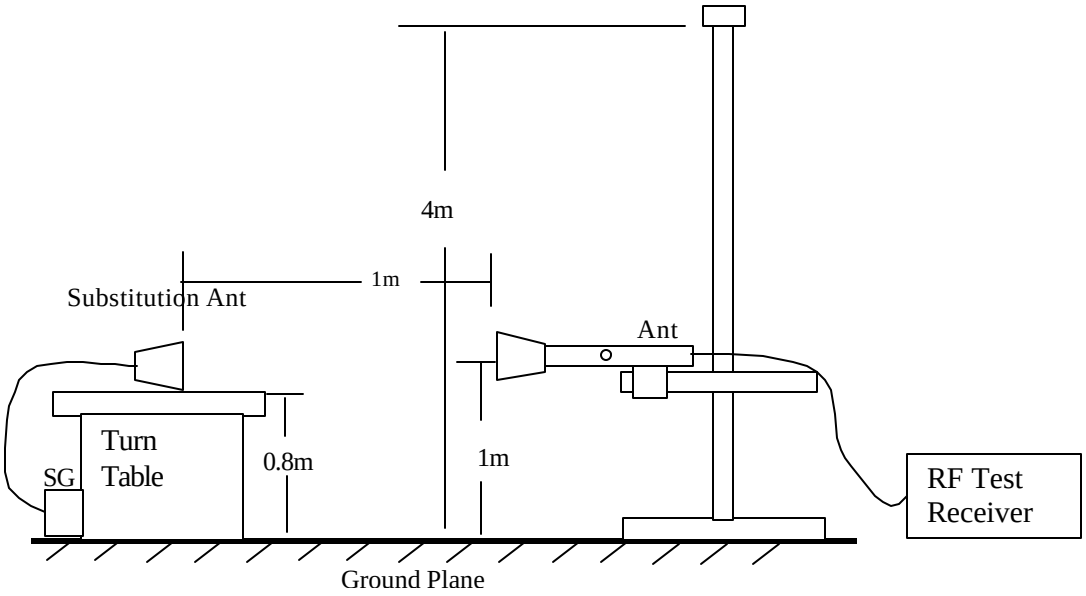

Radiated Emission – Substitution Method set-up

TEST PROCEDURE

1). On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.
2). The test antenna shall be oriented initially for vertical polarization located 1m from the EUT to correspond to the frequency of the transmitter.
3). The output of the test antenna shall be connected to the measuring receiver and either a peak or average detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
4). The transmitter shall be switched on, if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
5). The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
6). The transmitter shall than be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
7). The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
8). The maximum signal level detected by the measuring receiver shall be noted.
9). The transmitter shall be replaced by a substitution antenna.
10). The substitution antenna shall be oriented for vertical polarization.
11). The substitution antenna shall be connected to a calibrated signal generator.
12). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

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13). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
14). The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
15). The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
16). The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.
17). The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.

RESULT

No non-compliance noted, as shown below

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CDMA & AMPS: Low, Mid, & High Channels:

Frequency (GHz)	SA reading (dBuV)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
CDMA Spurious Emissions:									
Lo Channel:									
1.65	49.4	-58.09	1.10	8.10	5.95	-53.24	-13.00	-40.24	V
2.47	48.9	-55.01	1.32	9.00	6.85	-49.49	-13.00	-36.49	V
3.30	45.6	-54.75	1.54	8.90	6.75	-49.54	-13.00	-36.54	V (Noise Floor)
1.65	48.8	-58.80	1.10	8.10	5.95	-53.95	-13.00	-40.95	H
2.47	48.0	-55.91	1.32	9.00	6.85	-50.39	-13.00	-37.39	H
3.30	45.4	-54.95	1.54	8.90	6.75	-49.74	-13.00	-36.74	H (Noise Floor)
Mid Channel									
1.67	47.0	-60.35	1.10	8.10	5.95	-55.50	-13.00	-42.50	V
2.50	49.6	-53.56	1.10	8.10	5.95	-48.70	-13.00	-35.70	V
3.35	45.0	-55.20	1.54	8.90	6.75	-49.99	-13.00	-36.99	V (Noise Floor)
1.67	46.6	-60.87	1.10	8.10	5.95	-56.02	-13.00	-43.02	H
2.50	49.0	-54.16	1.10	8.10	5.95	-49.30	-13.00	-36.30	H
2.51	46.3	-57.49	1.32	9.00	6.85	-51.96	-13.00	-38.96	H
3.35	46.0	-54.20	1.54	8.90	6.75	-48.99	-13.00	-35.99	H (Noise Floor)
High Channel									
1.70	45.6	-61.74	1.10	8.10	5.95	-56.89	-13.00	-43.89	V
2.55	45.0	-58.64	1.32	9.00	6.85	-53.11	-13.00	-40.11	V
3.39	44.3	-55.74	1.54	8.90	6.75	-50.54	-13.00	-37.54	V (Noise Floor)
1.70	45.0	-62.34	1.10	8.10	5.95	-57.49	-13.00	-44.49	H
2.55	45.3	-58.34	1.32	9.00	6.85	-52.81	-13.00	-39.81	H
3.39	44.0	-56.04	1.54	8.90	6.75	-50.84	-13.00	-37.84	H (Noise Floor)
AMPS Spurious Emissions:									
Lo Channel:									
1.65	48.8	-58.80	1.10	8.10	5.95	-53.95	-13.00	-40.95	V
2.47	47.0	-56.91	1.32	9.00	6.85	-51.39	-13.00	-38.39	V
3.30	45.6	-54.75	1.54	8.90	6.75	-49.54	-13.00	-36.54	V (Noise Floor)
1.65	47.8	-59.80	1.10	8.10	5.95	-54.95	-13.00	-41.95	H
2.47	47.0	-56.91	1.32	9.00	6.85	-51.39	-13.00	-38.39	H
3.30	46.0	-54.35	1.54	8.90	6.75	-49.14	-13.00	-36.14	H (Noise Floor)
Mid Channel									
1.67	47.6	-59.87	1.10	8.10	5.95	-55.02	-13.00	-42.02	V
2.50	49.8	-54.36	1.10	8.10	5.95	-49.50	-13.00	-36.50	V
3.35	46.0	-54.20	1.54	8.90	6.75	-48.99	-13.00	-35.99	V (Noise Floor)
1.67	47.0	-60.47	1.10	8.10	5.95	-55.62	-13.00	-42.62	H
2.50	48.0	-56.16	1.10	8.10	5.95	-51.30	-13.00	-38.30	H
3.35	46.0	-54.20	1.54	8.90	6.75	-48.99	-13.00	-35.99	H (Noise Floor)
High Channel									
1.70	47.0	-60.34	1.10	8.10	5.95	-55.49	-13.00	-42.49	V
2.55	46.4	-57.24	1.32	9.00	6.85	-51.71	-13.00	-38.71	V
3.39	44.0	-56.04	1.54	8.90	6.75	-50.84	-13.00	-37.84	V (Noise Floor)
1.70	46.0	-61.34	1.10	8.10	5.95	-56.49	-13.00	-43.49	H
2.55	44.5	-59.14	1.32	9.00	6.85	-53.61	-13.00	-40.61	H
3.39	43.0	-57.04	1.54	8.90	6.75	-51.84	-13.00	-38.84	H (NoiseFloor)

Note: Completed scan from 30MHz to 10 GHz.

EPR = SG reading - CL + Gain (dBd)
Gain (dBd) = Gain (dBi) - 2.15
Margin = EPR - Limit

SA: Spectrum Analyzer, HP 8568B, S/N: 3710A00205
SG: Signal Generator, HP 83732B, S/N: US34490599
TX Antenna: Dipole, Compliance Design, Roberts, S/N: 116
Horn, EMCO 3115, S/N: 6717
CL: cable loss (5ft), FLEXCO
Pre-Amp: Miteq NSP2600 -44, S/N: 646456
RX Antenna: Bicon, Eston 94455-1, S/N: 1214
LP, EMCO 3146, S/N: 3163
Horn, EMCO 3115, S/N: 6739

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PCS: Low, Mid, & High Channels:

Frequency (GHz)	SA reading (dBuV)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
Spurious Emissions									
Lo Channel:									
3.70	40.0	-25.97	1.66	8.90	0.00	-18.73	-13.00	-5.73	V
5.55	41.2	-57.03	2.15	10.30	0.00	-48.88	-13.00	-35.88	V
7.41	52.0	-43.07	2.50	10.30	0.00	-35.27	-13.00	-22.27	V
9.26	49.0	-42.80	2.84	10.10	0.00	-35.54	-13.00	-22.54	V (Noise Floor)
3.70	41.7	-23.78	2.15	8.90	0.00	-17.03	-13.00	-4.03	H
5.55	42.6	-55.28	2.50	10.30	0.00	-47.48	-13.00	-34.48	H
7.41	51.5	-43.23	2.84	10.30	0.00	-35.77	-13.00	-22.77	H
9.26	44.6	-46.94	3.10	10.10	0.00	-39.94	-13.00	-26.94	H (Noise Floor)
Mid Channel									
3.76	41.5	-24.30	1.66	8.90	0.00	-17.06	-13.00	-4.06	V
5.64	41.8	-56.38	2.15	10.30	0.00	-48.23	-13.00	-35.23	V
7.52	53.0	-41.76	2.50	10.30	0.00	-33.96	-13.00	-20.96	V
9.40	47.0	-44.77	2.84	10.10	0.00	-37.51	-13.00	-24.51	V (Noise Floor)
3.76	41.0	-24.31	2.15	8.90	0.00	-17.56	-13.00	-4.56	H
5.64	49.0	-48.83	2.50	10.30	0.00	-41.03	-13.00	-28.03	H
7.52	50.0	-44.42	2.84	10.30	0.00	-36.96	-13.00	-23.96	H
9.40	48.0	-43.51	3.10	10.10	0.00	-36.51	-13.00	-23.51	H (Noise Floor)
High Channel									
3.82	40.0	-25.63	1.66	8.90	0.00	-18.39	-13.00	-5.39	V
5.73	55.3	-42.83	2.15	10.30	0.00	-34.68	-13.00	-21.68	V
7.64	54.0	-40.62	2.50	10.30	0.00	-32.83	-13.00	-19.83	V
9.54	53.3	-38.40	2.84	10.10	0.00	-31.14	-13.00	-18.14	V (Noise Floor)
3.82	44.0	-25.34	2.15	8.90	0.00	-18.59	-13.00	-5.59	H
5.73	42.3	-55.48	2.50	10.30	0.00	-47.68	-13.00	-34.68	H
7.64	41.5	-52.79	2.84	10.30	0.00	-45.33	-13.00	-32.33	H
9.54	40.8	-50.65	3.10	10.10	0.00	-43.64	-13.00	-30.64	H (Noise Floor)

Note: Completed scan from 30MHz to 20 GHz.

EIPR = SG reading - CL + Gain (dBi)
Margin = EIPR - Limit

SA: Spectrum Analyzer, HP 8593EM, S/N: 3710A00205
SG: Signal Generator, HP 83732B, S/N: US34490599
TX Antenna: Dipole, Compliance Design, Roberts, S/N: 116
Horn, EMCO 3115, S/N: 6717

CL: cable loss (5ft), FLEXCO
Pre-Amp: Miteq NSP2600 -44, S/N: 646456
RX Antenna: Bicon, Eston 94455-1, S/N: 1214
LP, EMCO 3146, S/N: 3163
Horn, EMCO 3115, S/N: 6739

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7.6. SECTION 2.1055: FREQUENCY STABILITY

INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	CAL. DUE DATE
EMI Receiver	HP	8593EM	6/11/03
Environmental Chamber	Thermotron	SE 600-10-10	4/26/03

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	Peak	300 Hz	300 Hz

TEST SETUP

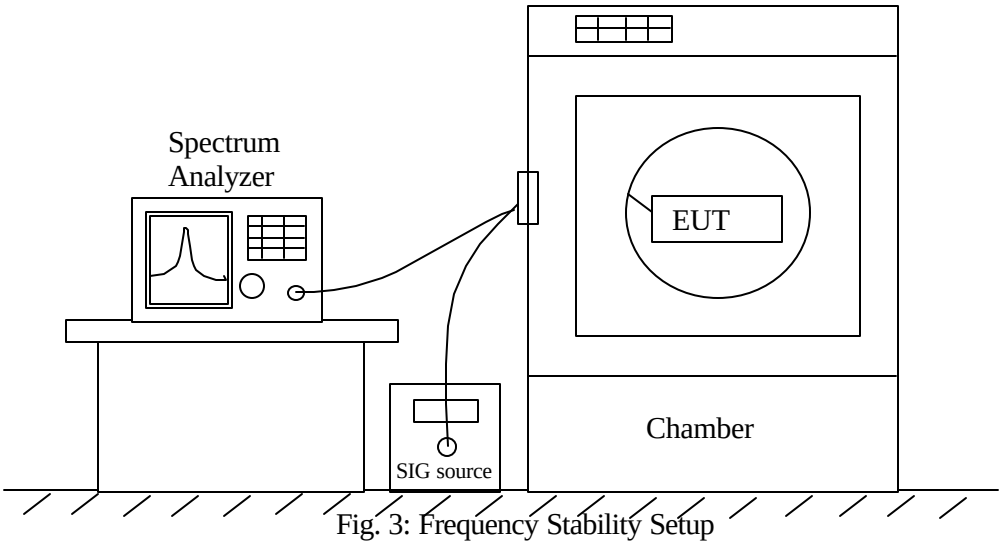

Fig. 3: Frequency Stability Setup

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TEST PROCEDURE

- **Frequency stability versus environmental temperature**

1). Setup the configuration per figure 6 for frequencies measurement inside the environmental chamber. Set the temperature of the chamber to 25°C. Set SA Resolution Bandwidth low enough to obtain the desired frequency resolution and measure the EUT 25°C operating frequency as reference frequency.
2). Turn EUT off and set Chamber temperature to -30°C.
3). Allow sufficient time (approximately 20 to 30 minus after chamber reach the assigned temperature) for EUT to stabilize. Turn on EUT and measure the EUT operating frequency. Turn off EUT after the measurement.
4). Repeat step 3 with a 10°C increased per stage until the highest temperature of +50°C reached, record all measured frequencies on each temperature step.

- **Frequency stability versus AC input voltage**

1). Setup the configuration per figure 6 and set chamber temperature to 25°C. Use a variable AC power supply to power the EUT and set AC output voltage to EUT nominal input AC voltage. Set SA Resolution Bandwidth low enough to obtain the desired frequency resolution and measure the EUT 25°C operating frequency as reference frequency.
2). Slowly reduce the EUT input voltage to specified extreme voltage variation (±15%) and record the maximum frequency change.

RESULT

No non-compliance noted, as shown below because the EUT uses the same OSC in both receiver and transmitter LO circuit. As a result, the frequency does not shift in Frequency Stability Test.

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Reference Frequency: CDMA Mid Channel 837.18380MHz @ 25˚C Limit: to stay ± 2.5 ppm = 2092.960 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (˚C)	(MHz)	Delta (ppm)	Limit (ppm)
3.70	50	837.18500	-1.433	± 2.5
3.70	40	837.18250	1.553	± 2.5
3.70	30	837.18500	-1.433	± 2.5
3.70	***25***	***837.18380***	***0***	***± 2.5***
3.70	20	837.18250	1.553	± 2.5
3.70	10	837.18500	-1.433	± 2.5
3.70	0	837.18500	-1.433	± 2.5
3.70	-10	837.18250	1.553	± 2.5
3.70	-20	837.18500	-1.433	± 2.5
3.70	-30	837.18500	-1.433	± 2.5

Reference Frequency: CDMA Mid Channel 837.1850MHz @ 25˚C Limit: to stay ± 2.5 ppm = 2092.963 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (˚C)	(MHz)	Delta (ppm)	Limit (ppm)
3.70	***25***	***837.18500***	***0***	***± 2.5***
2.85 - 3.00 (end point)	25	837.18290	*2.508*	± 2.5
3.15	25	837.18630	*-1.553*	± 2.5
4.26	25	837.18380	*1.433*	± 2.5

Reference Frequency: CDMA Mid Channel 837.17960MHz @ 25˚C Limit: to stay ± 2.5 ppm = 2092.949 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vac)	Temperature (˚C)	(MHz)	Delta (ppm)	Limit (ppm)
120.00	***25***	***837.17960***	***0***	***± 2.5***
102	25	837.17840	*1.433*	± 2.5
138	25	837.17980	*-0.239*	± 2.5

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Reference Frequency: AMPS Mid Channel 836.49000MHz @ 25˚C Limit: to stay ± 2.5 ppm = 2091.225 Hz				
Power Supply (Vdc)	Environment Temperature (˚C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.70	50	836.49013	-0.155	± 2.5
3.70	40	836.48988	0.143	± 2.5
3.70	30	836.49013	-0.155	± 2.5
3.70	***25***	***836.49000***	***0***	***± 2.5***
3.70	20	836.49013	-0.155	± 2.5
3.70	10	836.49013	-0.155	± 2.5
3.70	0	836.48988	0.143	± 2.5
3.70	-10	836.48963	0.442	± 2.5
3.70	-20	836.48938	0.741	± 2.5
3.70	-30	836.48925	0.897	± 2.5

Reference Frequency: AMPS Mid Channel 836.48955MHz @ 25˚C Limit: to stay ± 2.5 ppm = 2091.224 Hz				
Power Supply (Vdc)	Environment Temperature (˚C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.70	***25***	***836.48955***	***0***	***± 2.5***
2.85 - 3.00 (end point)	25	836.48969	-0.165	± 2.5
3.15	25	836.48961	-0.075	± 2.5
4.26	25	836.48956	-0.016	± 2.5

Reference Frequency: AMPS Mid Channel 836.48959MHz @ 25˚C Limit: to stay ± 2.5 ppm = 2091.224 Hz				
Power Supply (Vac)	Environment Temperature (˚C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
120.00	***25***	***836.48959***	***0***	***± 2.5***
102	25	836.48956	*0.030*	± 2.5
138	25	836.48961	*-0.030*	± 2.5

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Reference Frequency: PCS Mid Channel 1880.69450MHz @ 25˚C Limit: to stay ± 2.5 ppm = 4701.736 Hz				
Power Supply (Vdc)	Environment Temperature (˚C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.60	50	1880.69750	-1.595	± 2.5
3.60	40	1880.69700	-1.329	± 2.5
3.60	30	1880.69650	-1.063	± 2.5
3.60	***25***	***1880.69450***	***0***	***± 2.5***
3.60	20	1880.69650	-1.063	± 2.5
3.60	10	1880.69800	-1.861	± 2.5
3.60	0	1880.69750	-1.595	± 2.5
3.60	-10	1880.69650	-1.063	± 2.5
3.60	-20	1880.69650	-1.063	± 2.5
3.60	-30	1880.69750	-1.595	± 2.5

Reference Frequency: PCS Mid Channel 1880.82880MHz @ 25˚C Limit: to stay ± 2.5 ppm = 4702.072 Hz				
Power Supply (Vdc)	Environment Temperature (˚C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
3.70	***25***	***1880.82880***	***0***	***± 2.5***
2.85 - 3.00 (end point)	25	1880.82750	0.691	± 2.5
3.15	25	1880.83000	-0.638	± 2.5
4.26	25	1880.83250	-1.967	± 2.5

Reference Frequency: PCS Mid Channel 1880.68380MHz @ 25˚C Limit: to stay ± 2.5 ppm = 4701.710 Hz				
Power Supply (Vac)	Environment Temperature (˚C)	Frequency Deviation Measureed with Time Elapse (MHz)	Delta (ppm)	Limit (ppm)
120.00	***25***	***1880.68380***	***0***	***± 2.5***
102	25	1880.68500	-0.638	± 2.5
138	25	1880.68630	-1.329	± 2.5

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